THE BOOK OF BIRDS

NATIONAL GEOGRAPHIC SOCIETY

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THE BOOK OF BIRDS

NATIONAL GEOGRAPHIC SOCIETY
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THE BOOK *of* BIRDS

Birds of Town and Country, The Warblers, and American Game Birds

WITH 331 COLOR PORTRAITS OF NORTH AMERICAN BIRDS
AND 129 ILLUSTRATIONS IN BLACK AND WHITE

FOREWORD *by Dr. Gilbert Grosvenor, President of the National Geographic Society:* COMMON BIRDS OF TOWN AND COUNTRY, FRIENDS OF OUR FORESTS—THE WARBLERS, AND AMERICAN GAME BIRDS, *by Henry W. Henshaw, formerly Chief United States Biological Survey:* HOW BIRDS CAN TAKE THEIR OWN PORTRAITS, *by Hon. George Shiras, 3rd:* ENCOURAGING BIRDS AROUND THE HOME, *by Frederick H. Kennard:* OUR GREATEST TRAVELERS—MIGRATORY BIRDS, *by Wells W. Cooke:* THE WORLD RECORD FOR FEATHERED FRIENDS, and BIRD BANDING, THE TELLTALE OF MIGRATORY FLIGHT, *by Dr. E. W. Nelson, of the United States Biological Survey. Color Plates from Paintings from Life by Louis Agassiz Fuertes.*

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FOREWORD

In this revised volume are presented the principal articles and the most beautiful color illustrations of man's feathered friends which have been published in the National Geographic Magazine during the last thirteen years. The text and pictures comprise an authoritative and fascinating contribution to popular science.

The 331 portraits in color of the Common Birds of Town and Country, of our Warblers and American Game Birds, are reproductions of the matchless pictures from the brush of the distinguished artist-naturalist, Louis Agassiz Fuertes, while the descriptive text by Henry W. Henshaw, formerly Chief of the U. S. Biological Survey, sets forth concisely, entertainingly, yet with scientific accuracy, the distinguishing characteristics of each species of bird, its peculiar habits, and its favorite habitat.

Mr. Henshaw has pointed out the need for the preservation of bird life, showing that calamity would overtake our crops were it not for our feathered insect-destroyers.

Few wonders of the natural world are as compelling in interest as is the display of that mysterious impulse which season after season causes birds to migrate from their winter homes to their nesting places in the spring, and then to make the return journey in the fall, guided no one knows how—an absorbing study for both layman and scientist. The article by the late Wells W. Cooke, "Our Greatest Travelers: Birds that Fly from Pole to Pole," gives an account of these migrations, and the text is supplemented with a series of illuminating maps and charts.

Frederick H. Kennard's article, "Encouraging Birds Around the Home," accompanied by numerous illustrations in black and white, tells with the bird-lover's enthusiasm how every reader, be he proprietor of a great estate or the owner of a window-sill, can make the acquaintance and win the confidence of birds, adding them to his circle of appreciative friends and charming visitors.

George Shiras, 3rd, the inventor of wild-life flashlight photography and of methods of making animals and birds take their own portraits, gives some useful hints on the latter subject.

In "Bird Banding, the Telltale of Migratory Flight," Dr. Edward W. Nelson, of the U. S. Biological Survey, an internationally known authority on wild bird and animal life, tells of the amazing strides made in tracing the life story of wild birds by the unique method of tagging them. Dr. Nelson has given much time to the revision and bringing up to date of this new edition of the Book of Birds.

Utility and art are served alike when man befriends the birds.

GILBERT GROSVENOR,
President and Editor.

© Photograph by William L. and Irene Finley

A FAMILY OF DESERT SPARROWS

Little Johnnie, in the rear, was afraid his turn would never come; but he received the next mouthful. While these young birds looked alike, the mother knew one from the other, especially at mealtime.

COMMON BIRDS OF TOWN AND COUNTRY

By Henry W. Henshaw

Formerly Chief of the U. S. Biological Survey

With Illustrations in Color from Paintings by Louis Agassiz Fuertes

FROM very ancient times birds have appealed to the interest and imagination of mankind. They have furnished themes for innumerable poets, have appeared in many guises in primitive religions, and by their flight inspired the predictions of the soothsayers of old. Even in these modern and prosaic times birds still continue to interest mankind, and the last decade has witnessed a marked strengthening of the sentiment toward them.

The present interest is direct and personal, and to-day hundreds of thousands of men and women in various parts of the country, old as well as young, are employing much of their leisure in familiarizing themselves with the birds of their respective localities. The student, in following birds afield, in observing their habits, and listening to their songs, comes into close touch and sympathy with Nature and adds new zest to life—a zest, be it noted, which enriches without harm to any creature.

Would that the same could be said of the sportsman who almost invariably is at heart a Nature lover, though the primitive instinct to kill is uppermost. Many sportsmen, however, who formerly followed wild creatures only to kill, have abandoned the use of rifle and shotgun, and to-day are finding greater pleasure in studying and photographing their former quarry than they did in pursuing it with murderous intent. A real interest in wild life leads naturally to a love of Nature in all her varied manifestations, and this, in all lands and under all circumstances, remains a source of lasting pleasure.

FASHION AS AN ENEMY OF BIRDS

A love of birds from the esthetic side, however, is of comparatively recent development and had little place among primitive peoples, who utilized birds chiefly in two ways—for food and for ornament. Feathers, especially, appealed to them for purposes of adornment, and this barbaric taste has not only survived among civilized races, but in recent years has developed to an extent which threatens the very existence of many of the most beautiful and notable species of birds in various parts of the world. No region is too remote, no forest too deep, no mountains too high, to stay the plume-hunter, stimulated by the golden bribe offered by the tyrant Fashion.

Happily, America has taken the lead in an attempt to restrict this craze for feather adornment, which means nothing less than the death of millions of beautiful and useful creatures. Nor are evidences wanting that other countries as well have recognized the gravity of the situation and some have passed protective laws similar to those enacted in this country.

BIRDS ARE FARMERS' EFFICIENT ALLIES

While birds appeal to the regard and interest of man from the esthetic side as no other creatures do, there is another and even more important point of view. It is no doubt true that of late years interest in birds has been greatly stimulated by the discovery that they possess an economic value.

The study of the economic side of bird life and of the relations of birds to the farmer and horticulturist has been greatly stimulated in the United States by Federal aid and supervision. In no other country in the world have the activities of birds been so carefully investigated with reference to their practical bearing.

Under the Biological Survey of the Department of Agriculture, for instance, is a corps of trained men, who study the food of birds by careful examination of the stomachs of specimens killed for scientific purposes. The information thus gained is supplemented by observation in the field, and the result is a large amount

Photograph by Howard H. Cleaves

THE EXCITEMENT OF TOUCHING THE ECCENTRIC WOODCOCK ON THE BACK

of invaluable data illustrative of the economic relations of many kinds of birds. This storehouse of information has been largely drawn upon in the following pages.

OUR COUNTRY IS FORTUNATE IN THE NUMBER AND VARIETY OF ITS BIRDS

It would be strange indeed if our land, with its vast extent of territory, its diversified landscape, its extensive forests, its numerous lakes and streams, with its mountains, prairies, and plains, had not been provided by Nature with an abundant and diversified bird life. As a matter of fact, America has been favored with a great variety of birds famed both for beauty and for song. America also possesses certain families, as the Humming Birds and Wood Warblers, the like of which exist nowhere else in the world.

In considering the many kinds of birds in the United States from the practical side, they may not inaptly be compared to a police force, the chief duty of which is to restrain within bounds the hordes of insects that, if unchecked, would devour every green thing.

To accomplish this task successfully, the members of the force must be variously equipped, as we find they are. The nearly 1,400 kinds of birds that inhabit the United States and Alaska can be grouped in families which resemble each other in a general way, yet among the members of the several families are

Photograph by Elton Perry

THE SLACKER OF BIRDDOM EXPOSED

This is a picture of the nest of Mr. and Mrs. Yellow-breasted Chat (see pages 86–87), and the majority of the eggs belong to the lady of the house; but she has been imposed upon in her absence and made the victim of the indolence of her neighbor, Mrs. Cowbird (see pages 48–49), who has laid an egg in the Chat nest for Mrs. Chat to incubate with her own. Mrs. Cowbird, relieved of the responsibility of bringing up her progeny, is probably off indulging in some frivolity. This parasitic habit is a characteristic of the Cowbird. The darker egg is the alien embryo.

marked variations of form and plumage and still greater variation of habits, which fit them for their diversified duties.

As most insects spend more or less time on the ground, so we find that more birds are fitted for terrestrial service than for any other. Our largest bird family, the Sparrows, is chiefly terrestrial, and although its members depend much upon seeds for subsistence they spend no little share of their time searching for insects. They are ably aided in the good work by the Thrushes, Wrens, certain of the Warblers, and many other birds.

NATURE EQUIPPED WOODPECKERS FOR A SPECIAL TASK

Another group is of arboreal habits, and plays an important part in the conservation of our forests, the true value of which we have only recently learned to appreciate. So many insects burrow into trees that a highly specialized class of birds—the Woodpeckers—has been developed to dig them out. The bills, tongues, feet, and even the tails of these birds have been cunningly adapted to this one end, and the manner in which this has been done shows how fertile Nature is in equipping her servants to do her bidding.

The bark of trees also forms a favorite shelter for numerous insects, and behold the Wrens, Nuthatches, Warblers, and Creepers, with sharpest of eyes and slenderest of bills, to detect our foes and to dislodge them from crack and cranny!

The air is full of flying insects, and to take care of these there are the Swallows, Swifts, and Nighthawks, whose wings and bodies are so shaped as to endow them with the speed and agility necessary to follow all the turns and windings of their nimble insect prey.

Photograph by Dr. C. William Beebe

THE DANDY AMONG BIRDS

The Mexican Motmot is perhaps the only bird that mutilates its tail-feathers, after they are full grown, for purposes of decoration. A portion of the shafts is denuded by the bird, leaving the web at the tips to form a conspicuous racket.

The Whippoorwills, swift of wing and with capacious mouths beset with bristles, attend to the night-flying insects when most birds are asleep, while the Hawks by day and the Owls by night supplement the work of other birds and have a special function of their own—the destruction of noxious rodents.

Thus every family of birds plays its own part in the warfare against insects and other foes to man's industry, and contributes its share to man's welfare.

Birds would fall far short of what they accomplish for man were they not the most active of living things.

It is curious that the group of vertebrates which lives the fastest—that is, has a higher temperature and a more rapid circulation than any other—should be related by descent to a family of such cold-blooded creatures as the reptiles and lizards, which often go without food and hibernate for considerable periods. Very different is it with birds. Few realize the enormous quantity of food required to sustain the energy of these creatures, most of whose waking hours are spent in a never-ending search for food.

RAVAGES OF DISEASE-CARRYING INSECTS CHECKED

In satisfying their own hunger birds perform an important service to man; for, notwithstanding the fact that the acreage under cultivation in the United States is larger than ever before, and that the crops are greater, the cost of foodstuffs continually mounts upward. Meanwhile the destruction of farm and orchard crops by insects and by rodents amounts to many hundreds of millions each year, and if any part of this loss can be prevented it will be so much clear gain.

The protection of insectivorous and rodent-destroying birds is one of the most effective means of preventing much of this unnecessary loss, and the public is rapidly awakening to the importance of this form of conservation.

From the farmers' standpoint, such birds

as the Bobwhite, Prairie Chicken, the Upland Plover, and the other shore birds are worth very much more as insect eaters than as food or as objects of pursuit by the sportsman. This statement applies with especial force to such species as the Prairie Chicken, which everywhere in its old haunts is threatened with extinction.

The value of birds to the farmer is plain enough, but we do not usually think of birds as having any direct relation to the public health. To prove that they do, however, it is only necessary to state that 500 mosquitoes have been found in the stomach of a single Nighthawk; that in a Killdeer's stomach hundreds of the larvæ of the salt-marsh mosquito have been found, and that many shore birds and some ducks greedily devour mosquito larvæ.

As mosquitoes are known to carry the germs of such serious diseases as dengue fever and malaria, it is evident that by destroying them birds are conferring an important benefit on man. It may be added that not infrequently ticks are eaten by birds, and that the tick responsible for the spread of Texas fever among cattle has been found in the stomach of the Bobwhite.

Photograph by Dr. C. William Beebe

A TWO-STORY BIRD NEST

The nests of giant tropical Orioles, or Caciques, in Mexico are pendent structures 3 and 4 feet in length. They are usually built on the very tips of slender branches, so that they are protected from the attacks of arboreal beasts of prey. Often, as in this photograph, there is a small subsidiary chamber at the summit, which is used by the male bird as a roosting place when his mate is sitting on the eggs below.

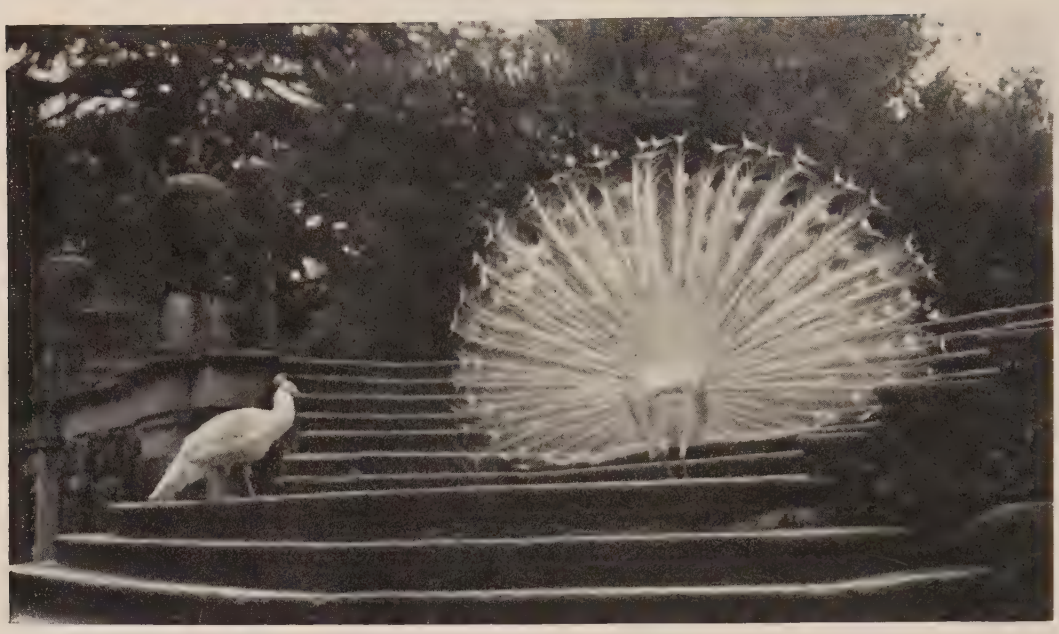
METHODS OF INCREASING OUR BIRD POPULATION

Since birds perform such invaluable service, every effort should be made to protect those we now have and to increase their numbers. This can be done in several ways: (*a*) by furnishing nesting boxes for certain species, such as Swallows, Martins, Wrens, Woodpeckers, Great-crested Flycatchers, and others; (*b*) by planting berry-bearing shrubs about the farm or orchard as food for the birds in winter; (*c*) by the establishment of bird sanctuaries, where birds may be reasonably safe from their natural enemies and be permitted to live and breed in absolute security as far as man is concerned.

The National Government, taking the lead in the last-named measure, has set apart no less than 74 bird refuges in various parts of the United States, including Alaska. These for the most part are of little or no agricultural value, but of very great usefulness in the cause of bird protection.

The example thus set is being followed by many of the States, notably Massachusetts, Pennsylvania and Minnesota.

A large and increasing number of private citizens are making bird preserves on their lands; many not only



Photograph by Arthur E. Mayer

HUSBAND AND WIFE

The magnificent plumage of the Peacock belongs only to the male, and it may be noticed that the female to the left of the picture is far less handsome than her husband, who presents us with a back view of his outstretched tail. These birds were once highly esteemed as food, and in the Middle Ages always figured at the most sumptuous banquets, roasted, but in all the glory of their gaudy plumage.

prevent the destruction of wild life on their forested estates, but go much farther, and endeavor in various ways to increase the number of their bird tenants.

SUET AND WATER FOR BIRDS

Efforts to protect birds on a smaller scale and to attract them about dwellings, with a view to their close companionship, are worthy of all praise, and such efforts should be even more common in this country than they are at present, particularly as the means involve little trouble or expense.

The presence of trees and shrubbery near the house is of itself an open invitation to birds which they are eager to accept, particularly if the shrubbery is not too closely pruned. Birds like thick vines and tangles, in the recesses of which they feel safe from their many enemies. Suet, nuts, and other bird foods, if exposed in conspicuous places, can usually be depended on to attract birds in winter, and often save many lives, especially when snow covers the ground.

Species which are not berry eaters, like the Woodpeckers, Nuthatches, Creepers, and Chickadees, can be made winter residents of many farms, even in the North, by putting out at convenient places a supply of suet, of which they and many other birds are very fond, even in summer. Hedges and thickets about the farm are important to furnish nesting sites and shelter both from the elements and from predatory enemies.

Few are aware of the difficulty often experienced by birds in obtaining water for drinking and bathing. A constant supply near the farmhouse will materially aid in attracting birds to the neighborhood and in keeping them there, at least till the time of migration. Shallow trays or basins of wood, metal or cement admirably serve the purpose, especially as birds delight to bathe in them.

By supplying artificial nest boxes the number of birds may be increased around farms and orchards, where their services are most needed. The average farmer's boy, if provided with a few tools, is quite equal to the task of making acceptable boxes for Martins, Swallows, Bluebirds,

© Howard H. Cleaves

OSPREY, OR FISH HAWK, RISING FROM A STRIKE

When a fish is sighted, this bird checks himself directly over the quarry on wings that beat horizontally, then down he goes at reckless speed with wings folded and talons wide open. There is a great splash as the Hawk strikes the water and seizes the fish by the back. In the picture above, the Osprey had been deceived by an artificial goldfish anchored to an 18-ounce stone, and it shows him shooting upward after the decoy had slipped from his grasp.

Wrens, Woodpeckers, and other species, which are far from fastidious as to the appearance of the box intended for their occupancy.

Entomologists have estimated that insects yearly cause a loss of upward of $700,000,000 to the agricultural interests of the United States. Were it not for our birds the loss would be very much greater, and, indeed, it is believed that without the aid of our feathered friends successful agriculture in many places might be impossible.

A knowledge of the birds that protect his crops is, therefore, as important to the farmer as a knowledge of the insect pests that destroy them. Such information is the more needful because the relation of birds to man's interests is extremely complex.

BIRDS UNFORTUNATELY DESTROY USEFUL PARASITES TOO

Thus, while it may be said that most of our birds are useful, there are only a few of them that are always and everywhere useful and that never do harm. Insectivorous birds, for instance, destroy, along with a vast number of harmful insects, some parasitic and predatory kinds. These latter are among Nature's most effective agents for keeping destructive insects in check.

To the extent, then, that birds destroy useful parasitic insects, they are harmful; but the good they do by the destruction of insects injurious to man's interests far outweighs the harm.

It may be said, too, that of the birds usually classed as noxious there are very few that do not possess redeeming traits. Thus the Crow is mischievous in spring and sorely taxes the farmer's patience and ingenuity to prevent him from pulling up the newly planted corn. Moreover, the Crow destroys the eggs and young of useful insectivorous and game birds. On the other hand, he eats many insects, especially white grubs and cutworms, and destroys many meadow mice; so that in

Official Photograph, U. S. Biological Survey

ROOSTING CROWS

Few sights in the bird world equal in impressiveness the assemblage of a large Crow roost. This photograph was taken after sundown, with an exposure of several minutes, at the Woodridge roost, near Washington, D. C. The air was filled with flying birds, but only those that remained stationary for the greater part of the exposure made a conspicuous photographic impression.

much (although not in all) of the region he inhabits the Crow must be considered to be more useful than harmful.*

POLICEMEN OF THE AIR

Most of the Hawks and Owls even—birds that have received so bad a name that the farmer's boy and the sportsman are ever on the alert to kill them—are very useful because they destroy vast numbers of insects and harmful rodents.

Birds occupy a unique position among the enemies of insects, since their powers of flight enable them at short notice to gather at points where there are abnormal insect outbreaks. An unusual abundance of grasshoppers, for instance, in a given locality soon attracts the birds from a wide area, and as a rule their visits cease only when there are no grasshoppers left.

So also a marked increase in the number of small rodents in a given neighborhood speedily attracts the attention of Hawks and Owls, which, by reason of their voracious appetites, destroy great numbers of the swarming foe.

One of the most useful groups of native birds is the Sparrow family. While some of the tribe wear gay suits of many hues, most of the Sparrows are clad in modest brown tints, and, as they spend much of the time in grass and weeds, are commonly overlooked.

Unobtrusive as they are, they lay the farmer under a heavy debt of gratitude by their food habits, since their chosen fare consists largely of the seeds of weeds. Selecting a typical member of the group, the Tree Sparrow, for instance, one-fourth ounce of weed seed per day is a conservative estimate of the food of an adult.

On this basis, in a large agricultural State like Iowa, Tree Sparrows annually eat approximately 875 tons of weed seeds.

* See "The Crow, Bird Citizen of Every Land," in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1920.

Photograph by Dr. J. B. Pardoe

BLACK AND WHITE, A STUDY IN CONTRASTS

A dog and a Crow would seem to be strange playmates, but a student of bird life tells of two such comrades who were raised on a farm. The chief sport of the Crow consisted in laying a stick within easy reach of the dog while the latter slept, then waking him with a nip on the heels. Whereupon, the bird would seize the stick and fly across the field with the dog in hot pursuit. The chase would continue until both play-fellows were exhausted.

Only the farmer, upon whose shoulders falls the heavy burden of freeing his land of noxious weeds, can realize what this vast consumption of weed seeds means in the saving and cost of labor.

Some idea of the money value of this group of birds to the country may be gained from the statement that the total value of the farm crops in the United States in 1926 reached the amazing sum of $7,802,719,000. If we estimate that the total consumption of weed seed by the combined members of the Sparrow family resulted in a saving of only 1 per cent of the crops—not a violent assumption—the sum saved to farmers by these birds in 1926 was $78,802,719.

MOST HAWKS AND OWLS ARE BENEFICIAL

The current idea in relation to Hawks and Owls is erroneous. These birds are generally classed as thieves and robbers, whereas a large majority of them are the farmer's friends and spend the greater part of their lives in pursuit of injurious insects and rodents. The Hawks work by day, the Owls chiefly by night; so that the useful activities of the two classes are continued practically throughout the 24 hours.

As many as 100 grasshoppers have been found in the stomach of a Swainson's Hawk, representing a single meal; and in the retreat of a pair of Barn Owls have been found more than 3,000 skulls, 97 per cent of which were of mammals, the bulk consisting of field mice, house mice, and common rats. Nearly half a bushel of the remains of pocket gophers—animals which are very destructive in certain parts of the United States—was found near a nest of this species. The notable increase of noxious rodents during the last few years in certain parts of the United States and the consequent damage to crops are due in no small part

Photograph by George Shiras, 3rd

A CATBIRD IN A FLORIDA ORANGE GROVE

Mr. Shiras, in recounting his experiences in photographing birds that patronized his "orange juice" stand following a three-months' drought in Florida, says that in four hours he succeeded in getting pictures of a male and a female Cardinal, a Mocking Bird, a male and a female Chewink, a Turtle Dove, Sand Dove, Brown Thrasher, Field Sparrows, and a male and a female Quail.

to the diminished number of birds of prey, which formerly destroyed them and materially aided in keeping down their numbers.

A few Hawks are injurious, and the bulk of the depredations on birds and chickens chargeable against Hawks is committed by three species—the Cooper's Hawk, the Sharp-shinned Hawk, and the Goshawk (see page 59). The farmer's boy should learn to know these daring robbers by sight, so as to kill them whenever possible.

IT IS A MISTAKE TO OFFER BOUNTIES FOR ALL HAWKS

From the foregoing it will at once appear that the practice of offering bounties indiscriminately for the heads of Hawks and Owls, as has been done by some States, is a serious mistake, the result being not only a waste of public funds, but the destruction of valuable servants which can be replaced, if at all, only after the lapse of years.

As a rule, birds do not live very long, but, as previously stated, they live fast. They breathe rapidly and have a higher temperature and a more rapid circulation than other vertebrates. This is a fortunate circumstance, since to generate the requisite force to sustain their active bodies a large quantity of food is necessary, and, as a matter of fact, birds have to devote most of their waking hours to obtaining insects, seeds, berries, and other kinds of food.

The activity of birds in the pursuit of insects is still further stimulated by the fact that the young of most species, even those which are by no means strictly insectivorous, require great quantities of animal food in the early weeks of existence, so that during the summer months—the flood time of insect life—birds are compelled to redouble their attacks on

Photograph by George Shiras, 3rd

CEDAR WAXWINGS NEAR THE CAMERA

While watching for deer on the shores of Lake Superior one summer, Mr. Shiras observed Cherry Birds over the water after white millers. A stick with branches at right angles was placed near the photographer's blind and a camera, with a pulling string attached, was set up only three feet away from the perch. Soon a single bird was photographed, then two, and finally the three shown above.

our insect foes to satisfy the wants of their clamorous young.

ASTONISHING CAPACITY OF BIRDS' STOMACHS REVEALED BY 85,000 TESTS

Field observations of the food habits of birds serve a useful purpose, but they are rarely accurate enough to be fully reliable. The presence of certain birds in a corn or wheat field or in an orchard is by no means proof, as is too often assumed, that they are devastating the grain or fruit. They may have been attracted by insects which, unknown to the farmer or orchardist, are fast ruining his crop. Hence it has been found necessary to examine the stomachs and crops of birds to ascertain definitely what and how much they eat.

The Biological Survey has in this way examined upward of 85,000 birds, most of which have been obtained during the last 45 years from scientific collectors, for our birds are too useful to be sacrificed when it can possibly be avoided, even for the sake of obtaining data upon which to base legislation for their protection.

It is interesting to observe that hungry birds—and birds are hungry most of the time—are not content to fill their stomachs with insects or seeds, but after the stomach is stuffed, until it will hold no more, continue to eat till the crop or gullet also is crammed. It is often the case that when the stomach is opened and the contents heaped up, the pile is two or three times as large as the stomach was when filled.

Birds may truly be said to have healthy appetites. To show the astonishing capacity of birds' stomachs and to reveal the extent to which man is indebted to

MAP SHOWING THE BIRD ZONES

With their unparalleled facilities for locomotion over both land and water, birds are more widely distributed than any other vertebrates, yet their comparatively delicate organizations are highly sensitive to many conditions of life. The most important factor in determining the breeding range of birds is, of course, climate.

This zone map shows that North America is divided into three great regions—the Boreal, Austral, and Tropical—and the first two in turn are subdivided into three zones each. The boundaries of the zones follow in a general way certain lines of temperature, with subdivisions determined by the annual rainfall. The numerous "lakes" and "islands" noted on the zone map are brought about in most cases by the altitude of these areas.

birds for the destruction of noxious insects, the following facts are given as learned by stomach examinations made by assistants of the Biological Survey:

A Tree Swallow's stomach was found to contain 40 entire chinch bugs and fragments of many others, besides 10 other species of insects. A Bank Swallow in Texas devoured 68 cotton boll weevils, one of the worst insect pests that ever invaded the United States; and 35 Cliff Swallows had taken an average of 18 boll weevils each. Two stomachs of Pine Siskins from Hayward, Calif., contained 1,900 black olive scales and 300 plant lice. A Killdeer's stomach taken in November in Texas contained more than 300 mosquito larvæ.

A Flicker's stomach held 28 white grubs. A Nighthawk's stomach collected in Kentucky contained 34 May beetles, the adult form of white grubs. Another Nighthawk, from New York, had eaten 24 clover-leaf weevils and 375 ants. Still another Nighthawk had eaten 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps, and a spider. A Boat-tailed Grackle from Texas had eaten at one meal about 100 cotton bollworms, besides a few other insects. The crop of a Ring-necked Pheasant from Washington contained 8,000 seeds of chickweed and a dandelion head. More than 72,000 seeds have been found in a single Duck stomach taken in Louisiana in February.

A FARMER SHOULD KNOW HIS BIRD FRIENDS

A knowledge of his bird friends and enemies, therefore, is doubly important to the farmer and orchardist in order that he may protect the kinds that earn protection by their services and may drive away or destroy the others. At the present time many kinds of useful birds need direct intervention in their behalf as never before.

The encroachments of civilization on timbered tracts and the methods of modern intensive cultivation by destroying or restricting breeding grounds of birds tend to diminish their ranks. The number of insect pests, on the other hand, is all the time increasing through importations from abroad and by migration from adjoining territories.

Every effort, therefore, should be made to augment the numbers of our useful birds by protecting them from their enemies, by providing nesting facilities, and by furnishing them food in times of stress.

One of the worst foes of our native birds is the house cat, and probably none of our native wild animals destroys as many birds on the farm, particularly fledglings, as cats. The household pet is by no means blameless in this respect, for the bird-hunting instinct is strong, even in the well-fed tabby; but much of the loss of our feathered life is attributable to the half-starved stray, which in summer is as much at home in the groves and fields as the birds themselves.

Forced to forage for their own livelihood, these animals, which are almost as wild as the ancestral wild cat, inflict an appalling loss on our feathered allies, and even on the smaller game birds, like the Woodcock and Bobwhite.

If cats are to find place in the farmer's household, every effort should be made by carefully feeding and watching them to insure the safety of the birds. The cat without a home should be mercifully put out of the way.

In the following pages our commoner birds are discussed, including some that are destructive. They inhabit various parts of the country, and it is to the interest of the farmers of the respective localities to be familiar with them.

A colored illustration of each important species by the well-known naturalist-artist, Louis Agassiz Fuertes, is given, so as to enable the reader to identify the bird at a glance. The accounts of the birds' habits are necessarily brief, but they are believed to be sufficient to acquaint the reader with the most prominent characteristics of the several species, at least from the standpoint of their relation to man.

The measurements given in the following pages are from tip of bill to tip of tail.

BLUEBIRD (**Sialia sialis** and subspecies)

Length, about 6½ inches.

Range: Breeds in the United States (west to Arizona, Colorado, Wyoming, and Montana), southern Canada, Mexico, and Guatemala; winters in the southern half of the eastern United States and south to Guatemala.

Characteristics: The Bluebird is one of the most familiar tenants of the farm and dooryard. Everywhere it is hailed as the harbinger of spring, and wherever it chooses to reside it is sure of a warm welcome. This bird, like the Robin, Phœbe, House Wren, and some Swallows, is very domestic in its habits. Its favorite nesting sites are crannies in the farm buildings or boxes made for its use or natural cavities in old apple trees. For rent the bird pays amply by destroying insects and it takes no toll from the farm crop.

The Bluebird's diet consists of 68 per cent insects to 32 per cent vegetable matter. The largest items of insect food are grasshoppers first and beetles next, while caterpillars stand third. All of these are harmful except a few of the beetles. The vegetable food consists chiefly of fruit pulp, only an insignificant portion of which is of cultivated varieties. Among wild fruits elderberries are the favorite.

From the above it will be seen that the Bluebird does no essential harm, but, on the contrary, eats many harmful and annoying insects.

AMERICAN ROBIN (**Turdus migratorius** and subspecies)

Length, 10 inches.

Range: Breeds in the United States (except the Gulf States), Canada, Alaska, and Mexico; winters in most of the United States and south to Guatemala.

Characteristics: In the North and some parts of the West the Robin is among the most cherished of our native birds. Should it ever become rare where now common, its joyous summer song and familiar presence will be sadly missed in many a homestead. The Robin is an omnivorous feeder, and its food includes many orders of insects, with no very pronounced preference for any. It is very fond of earthworms, but its real economic status is determined by the vegetable food, which amounts to about 58 per cent of all. The principal item is fruit, which forms more than 51 per cent of the total food. The fact that in the examination of over 1,200 stomachs the percentage of wild fruit was found to be five times that of the cultivated varieties suggests that berry-bearing shrubs, if planted near the orchard, will serve to protect more valuable fruits.

In California in certain years it has been possible to save the olive crop from hungry Robins only by the most strenuous exertions and considerable expense. The bird's general usefulness is such, however, that all reasonable means of protecting orchard fruit should be tried before killing it.

RUSSET-BACKED THRUSH (**Hylocichla ustulata** and subspecies)

Length, 7¼ inches. Among Thrushes having the top of head and tail nearly the same color as the back, this one is distinguished by its tawny eye-ring and cheeks. The Pacific coast subspecies is russet brown above, while the other subspecies is the Olive-backed Thrush. The remarks below apply to the species as a whole.

Range: Breeds in the forested parts of Alaska and Canada and south to California, Colorado, Michigan, New York, West Virginia (mountains), and Maine; winters from Mexico to South America.

Characteristics: This is one of a small group of Thrushes the members of which are by many ranked first among American song birds. The several members resemble one another in size, plumage, and habits.

While this Thrush is very fond of fruit, its partiality for the neighborhood of streams keeps it from frequenting orchards far from water. It is most troublesome during the cherry season, when the young are in the nest. From this it might be inferred that the young are fed on fruit, but such is not the case. The adults eat fruit, but the nestlings, as usual, are fed mostly upon insects. Beetles constitute the largest item of animal food, and ants come next. Many caterpillars also are eaten. The great bulk of vegetable food consists of fruit, two-fifths of which is of cultivated varieties.

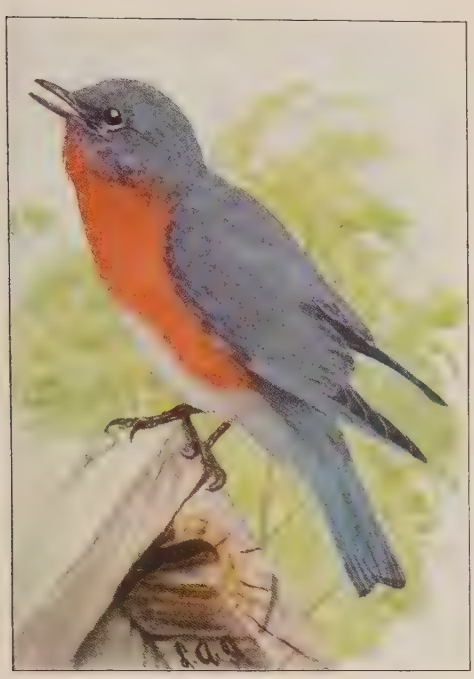
RUBY-CROWNED KINGLET (**Corthylio calendula** and subspecies)

Length, about 4¼ inches. Olive green above, soiled whitish below, concealed feathers on head (crest) bright red.

Range: Breeds in forested parts of Canada, Alaska, and the higher mountains of the western United States; winters in much of the United States and south to Guatemala.

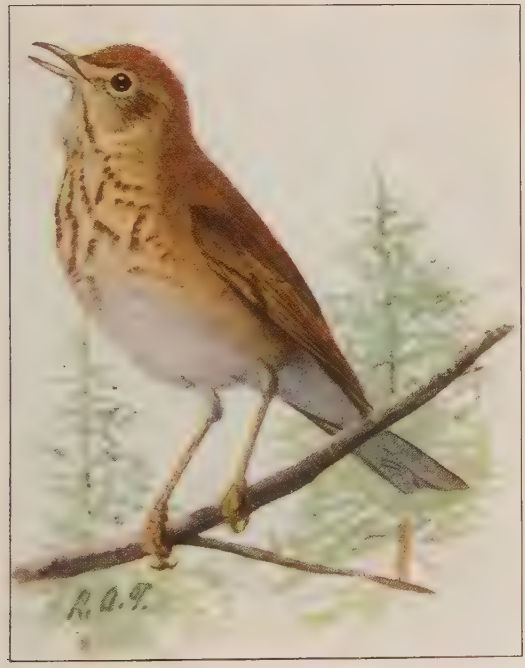
Characteristics: In habits and haunts this tiny sprite resembles a Chickadee. It is an active, nervous little creature, flitting hither and yon in search of food, and in spring stopping only long enough to utter its beautiful song, surprisingly loud for the size of the musician. Three-fourths of its food consists of wasps, bugs, and flies. Beetles are the only other item of importance (12 per cent).

The bugs eaten by the Kinglet are mostly small, but, happily, they are the most harmful kinds. Tree-hoppers, leaf-hoppers, and jumping plant lice are pests and often do great harm to trees and smaller plants, while plant lice and scale insects are the worst scourges of the fruit grower; in fact, the prevalence of the latter has almost risen to the magnitude of a national peril. It is such small and seemingly insignificant birds that most successfully attack and hold in check these insidious foes of horticulture. The vegetable food consists of seeds of poison ivy, or poison oak, a few weed seeds, and a few small fruits, mostly elderberries.



BLUEBIRD

ROBIN



RUSSET-BACKED THRUSH

RUBY-CROWNED KINGLET

CHICKADEE (**Penthestes atricapillus** and subspecies)

Length, about 5¼ inches.

Range: Resident in the United States (except the southern parts east of the Plains), Canada, and Alaska.

Characteristics: Because of its delightful notes, with confiding ways, and its fearlessness, the Chickadee is one of our best-known birds. It responds to encouragement, and by hanging within its reach a constant supply of suet the Chickadee can be made a regular visitor to the garden and orchard.

Though insignificant in size, Titmice are far from being so from the economic standpoint, owing to their numbers and activity. While one locality is being scrutinized for food by a larger bird, 10 are being searched by the smaller species.

The Chickadee's food is made up of insects and vegetable matter in the proportion of 7 of the former to 3 of the latter. Moths and caterpillars are favorites and form about one-third of the whole. Beetles, ants, wasps, bugs, flies, grasshoppers, and spiders make up the rest. The vegetable food is composed of seeds, largely those of pines, with a few of the poison ivy and some weeds. It usually makes its nest in a hole of a tree, but some members of the family build pendulous houses.

There are few more useful birds than the Chickadees.

BROWN CREEPER (**Certhia familiaris americana** and other American subspecies)

Length, 5½ inches.

Range: Breeds from Nebraska, Indiana, North Carolina (mountains), and Massachusetts north to southern Canada, also in the mountains of the western United States, north to Alaska, south to Nicaragua; winters over most of its range.

Characteristics: Rarely indeed is the Creeper seen at rest. It appears to spend its life in an incessant scramble over the trunks and branches of trees, from which it gets all its food. It is protectively colored so as to be practically invisible to its enemies and, though delicately built, possesses amazingly strong claws and feet. Dr. Frank M. Chapman says that it sings "an exquisitely pure, tender song of four notes."

Its tiny eyes are sharp enough to detect insects so small that most other species pass them by. Altogether the Creeper fills a unique place in the ranks of our insect destroyers. Its food consists of minute insects and insects' eggs, the cocoons of tineid moths, which eat our clothes and carpets, small wasps, ants, and bugs, especially scales and plant lice, with some small caterpillars.

As the Creeper remains in the United States throughout the year, it naturally feeds on hibernating insects and insect eggs, as well as on spiders and spiders' eggs, that are missed by the summer birds. On its bill of fare we find no product of husbandry nor any useful insects.

WHITE-BREASTED NUTHATCH (**Sitta carolinensis** and subspecies)

Length, 6 inches. White below, above gray, with a black head.

Range: Resident in the United States, southern Canada, and Mexico.

Characteristics: This bird might readily be mistaken by a careless observer for a small Woodpecker, but its note, an oft-repeated *yank*, is very unwoodpeckerlike, and, unlike either Woodpeckers or Creepers, it climbs downward as easily as upward and seems to set the laws of gravity at defiance. The name was suggested by the habit of wedging nuts, especially beechnuts, in the crevices of bark so as to break them open by blows from the sharp, strong bill.

The Nuthatch gets its living from the trunks and branches of trees, over which it creeps from daylight to dark. Insects and spiders constitute a little more than 50 per cent of its food. The largest items of these are beetles, moths, and caterpillars, with ants and wasps. The animal food is all in the bird's favor except a few ladybird beetles. More than half of the vegetable food consists of mast—that is, acorns and other nuts or large seeds. One-tenth of the food is grain, mostly waste corn. The Nuthatch does no injury, so far as known, and much good.

HOUSE WREN (**Troglodytes aëdon** and subspecies)

Length, 4¾ inches. The only one of our Wrens with wholly whitish underparts that lacks a light line over the eye.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and southern Canada; winters in the southern United States and Mexico.

Characteristics: The rich, bubbling song of the familiar little House Wren is one of the sweetest associations connected with country and suburban life. Its tiny body, long bill, sharp eyes, and strong feet peculiarly adapt it for creeping into all sorts of nooks and crannies where lurk the insects it feeds on.

A cavity in a fence post, a hole in a tree, or a box will be welcomed alike by this busybody as a nesting site; but since the advent of the quarrelsome English Sparrows such domiciles are at a premium and the Wren's eggs and family are safe only in cavities having entrances too small to admit the Sparrow. Hence it behooves the farmer's boy to provide boxes, the entrances to which are about an inch in diameter, nailing these under gables of barns and outhouses or in orchard trees. In this way the numbers of this useful bird can be increased, greatly to the advantage of the farmer. Grasshoppers, beetles, caterpillars, bugs, and spiders are the principal elements of its food. Cutworms, weevils, ticks, and plant lice are among the injurious forms eaten.

The House Wren lays from six to eight eggs and its voracious nestlings consume an enormous number of insects.

CHICKADEE

WHITE-BREASTED NUTHATCH

BROWN CREEPER

HOUSE WREN

CATBIRD (Dumetella carolinensis)

Length, about 9 inches. The slaty-gray plumage and black cap and tail are distinctive.

Range: Breeds throughout the United States west to New Mexico, Utah, Oregon, and Washington, and in southern Canada; winters from the Gulf States to Panama.

Characteristics: In many localities the Catbird is one of the commonest birds. Tangled growths are its favorite nesting places and retreats, but berry patches and ornamental shrubbery are not disdained. Hence the bird is a familiar dooryard visitor. It has a fine song, unfortunately marred by occasional catcalls.

With habits similar to those of the Mocking Bird and a song almost as varied, the Catbird has never secured a similar place in popular favor. Half of its food consists of fruit, and the cultivated crops most often injured are cherries, strawberries, raspberries, and blackberries. Beetles, ants, crickets, and grasshoppers are the most important elements of its animal food.

This bird is known to attack a few pests, such as cutworms, leaf bettles, clover-root curculios, and the periodical cicada; but the good it does in this way probably does not pay for the fruit it steals. The extent to which it should be protected may perhaps be left to the individual cultivator—that is, it should be made lawful to destroy Catbirds that are doing manifest damage to crops.

LOGGERHEAD SHRIKE (Lanius ludovicianus and subspecies)

Length, about 9 inches. A gray, black, and white bird, distinguished from the somewhat similarly colored Mocking Bird by the black stripe on side of head.

Range: Breeds throughout the United States, Mexico, and southern Canada; winters in the southern half of the United States and in Mexico to the Isthmus of Tehuantepec.

Characteristics: The Loggerhead Shrike, or southern Butcher Bird, is common throughout its range and is sometimes called "French Mocking Bird" from a superficial resemblance and not from its notes, which are harsh and unmusical.

The Shrike is naturally an insectivorous bird which has extended its bill of fare to include small mammals, birds, and reptiles. Its hooked beak is well adapted to tearing its prey, while to make amends for the lack of talons it has hit upon the plan of forcing its victim, if too large to swallow, into the fork of a bush or tree, where it can tear it asunder.

Insects, especially grasshoppers, constitute the larger part of its food, though beetles, moths, caterpillars, ants, wasps and a few spiders also are taken. While the Butcher Bird occasionally catches small birds, its principal vertebrate food is small mammals, as field mice, shrews, and moles, and when possible it obtains lizards. It habitually impales its surplus prey on a thorn, sharp twig, or barb of a wire fence.

MYRTLE WARBLER (Dendroica coronata and subspecies)

Length, 5½ inches. The similarly colored Audubon's Warbler has a yellow throat instead of a white one.

Range: Breeds throughout most of the forested area of Canada, northern Alaska and south to Minnesota, Michigan, New York, and Massachusetts; winters in the southern two-thirds of the United States and south to Panama.

Characteristics: This member of our beautiful Wood-Warbler family—a family peculiar to America—has the characteristic voice, coloration. and habits of its kind. Trim of form and graceful of motion, when seeking food it combines the methods of the Wrens, Creepers, and Flycatchers.

It breeds only in the northern parts of the eastern United States, but in migration it occurs in every patch of woodland and is so numerous that it is familiar to every observer. Its place is taken in the West by Audubon's Warbler.

More than three-fourths of the food of the Myrtle Warbler consists of insects, practically all of them harmful. It is made up of small beetles, including some weevils, with many ants and wasps. This bird is so small and nimble that it successfully attacks insects too minute to be prey for larger birds. Scales and plant lice form a very considerable part of its diet. Flies are the largest item of food; in fact, only a few Flycatchers and Swallows eat as many flies as this bird. The vegetable food (22 per cent) is made up of fruit and the seeds of poison oak or ivy; also the seeds of pine and of the bayberry.

AMERICAN BARN SWALLOW (Hirundo rustica erythrogastris)

Length, about 7 inches. Distinguished among our Swallows by deeply forked tail.

Range: Breeds throughout the United States (except the South Atlantic and Gulf States) and most of Canada; winters in South America.

Characteristics: This is one of the most familiar birds of the farm and one of the greatest insect destroyers. From daylight to dark on tireless wings it seeks its prey, and the insects destroyed are countless. Its favorite nesting site is a barn rafter, upon which it sticks its mud basket.

Most modern barns are so tightly constructed that Swallows cannot gain entrance, and in New England and some other parts of the country Barn Swallows are much less numerous than formerly. Farmers can easily provide for the entrance and exit of the birds and so materially increase their numbers. It may be well to add that the parasites that sometimes infest the nests of Swallows are not the ones the careful housewife dreads and no fear need be felt of the infestation spreading to the houses.

Insects taken on the wing constitute the almost exclusive diet of the Barn Swallow. More than one-third of the whole consists of flies. Beetles stand next in order and consist of many of the small dung beetles of the May-beetle family that swarm over the pastures in the late afternoon.

CATBIRD

MYRTLE WARBLER

LOGGERHEAD SHRIKE

BARN SWALLOW

PURPLE MARTIN (**Progne subis** and subspecies)

Length, about 8 inches.

Range: Breeds throughout the United States except the Pacific Coast region, and southern Canada, south to central Mexico; winters in South America.

Characteristics: This is the largest, as it is one of the most beautiful, of the Swallow tribe. It formerly built its nests in cavities of trees, as it still does in wild districts, but learning that man was a friend it soon adopted domestic habits. Its presence about the farm can often be secured by erecting houses suitable for nesting sites and by protecting them from usurpation by the English Sparrow.

Every effort should be made to increase the number of colonies of this very useful bird. The boxes should be at a reasonable height, say 15 feet from the ground, and made inaccessible to cats. A colony of these birds on a farm makes great inroads upon the destructive insect population.

Fifty years ago in New England it was not uncommon to see colonies of 50 pairs of Martins; but most of them have now vanished for no apparent reason except that the Martin houses have decayed and have not been renewed.

More than three-fourths of this bird's food consists of wasps, bugs, and beetles, their importance being in the order given. The beetles include several species of harmful weevils, as the clover-leaf weevils and the nut weevils. Besides these are many crane flies, moths, May flies, and dragonflies.

ROSE-BREASTED GROSBEAK (**Hedymeles ludovicianus**)

Length, 8 inches.

Range: Breeds from Kansas, Ohio, Georgia (mountains), and New Jersey, north to southern Canada; winters from Mexico to South America.

Characteristics: This beautiful Grosbeak is noted for its clear, melodious notes, which are poured forth in generous measure. The Rosebreast sings even at midday during summer, when the intense heat has silenced almost every other songster. Its beautiful plumage and sweet song are not its sole claim on our favor, for few birds are more beneficial to agriculture.

The Rosebreast eats some green peas and does some damage to fruit, but this mischief is much more than balanced by its destruction of insect pests.

The bird is so fond of the Colorado potato beetle that it has earned the name of "Potato-bug Bird," and no less than a tenth of the total food of the Rosebreasts examined consists of potato beetles—evidence that it is one of the most important enemies of this pest. It vigorously attacks cucumber beetles and many of the scale insects. It proved an active enemy of the Rocky Mountain locust during that insect's ruinous invasions. Among the other pests consumed are the spring and fall cankerworms, orchard and forest tent caterpillars, tussock, gipsy, and brown-tail moths, plum curculio, army worm, and chinch bug. In fact, not one of our birds has a better record.

BLACK-HEADED GROSBEAK (**Hedymeles melanocephalus**)

Length, about 8¼ inches.

Range: Breeds from the Pacific coast to Nebraska and the Dakotas, and from southern Canada to southern Mexico; winters in Mexico.

Characteristics: The Black-headed Grosbeak takes the place in the West of the Rosebreast in the East, and, like it, is a fine songster. Like it, also, the Blackhead readily resorts to orchards and gardens and is common in agricultural districts.

The bird has a very powerful bill and easily crushes or cuts into the firmest fruit. It feeds upon cherries, apricots, and other fruits, and also does some damage to green peas and beans; but it is such an active foe of certain horticultural pests that we can afford to overlook its faults. Several kinds of scale insects are freely eaten, and one, the black olive scale, constitutes a fifth of the total food. In May many cankerworms and codling moths are consumed, and almost a sixth of the bird's seasonal food consists of flower beetles, which do incalculable damage to cultivated flowers and to ripe fruit.

For each quart of fruit consumed by the Black-headed Grosbeak it destroys in actual bulk more than 1½ quarts of black olive scales and one quart of flower beetles besides a generous quantity of codling-moth pupæ and cankerworms. It is obvious that such work as this pays many times over for the fruit destroyed.

SONG SPARROW (**Melospiza melodia** and subspecies)

Length, about 6¼ inches. The heavily spotted breast with central blotch is characteristic.

Range: Breeds in the United States (except the South Atlantic and Gulf States), southern Canada, southern Alaska, and Mexico; winters from Pacific coast of Alaska and most of the United States to southern border of Mexican tableland.

Characteristics: Like the familiar little "Chippy," the Song Sparrow is one of our most domestic species, and builds its nest in hedges or in garden shrubbery close to houses, whenever it is reasonably safe from the house cat, which, however, takes heavy toll of the nestlings. It is a true harbinger of spring, and its delightful little song is trilled forth from the top of some green shrub in early March and April, before most of our other songsters have thought of leaving the sunny South.

Song Sparrows vary much in habits, as well as in size and coloration. Some forms live along streams bordered by deserts, others in swamps among bulrushes and tules, others in timbered regions, others on rocky barren hillsides, and still others in rich, fertile valleys.

With such a variety of habitat, the food of the species naturally varies considerably. About three-fourths of its diet consists of the seeds of noxious weeds and one-fourth of insects. Of these, beetles, especially weevils, constitute the major portion. Ants, wasps, bugs (including the black olive scale), and caterpillars are also eaten. Grasshoppers are taken by the Eastern birds, but not by the Western ones.

PURPLE MARTIN

BLACK-HEADED GROSBEAK

ROSE-BREASTED GROSBEAK

SONG SPARROW

CHIPPING SPARROW (Spizella passerina and subspecies)

Length, about 5¼ inches. Distinguished by the chestnut crown, black line through eye, and black bill.

Range: Breeds throughout the United States, south to Nicaragua, and north to southern Canada; winters in the southern United States and southward to Nicaragua.

Characteristics: The Chipping Sparrow is very friendly and domestic, and often builds its nest in gardens and orchards or in the shrubbery close to dwellings. Its gentle and confiding ways endear it to all bird lovers.

This is one of the most insectivorous of all the Sparrows. Its diet consists of about 42 per cent insects and spiders and 58 per cent vegetable matter. The animal food consists largely of caterpillars, of which it feeds a great many to its young. Besides these, it eats beetles, including many weevils, of which one stomach contained 30. It also eats ants, wasps, and bugs. Among the latter are plant lice and black olive scales. The vegetable food is practically all weed seed.

A nest with 4 young of this species was watched at different hours on 4 days. In the 7 hours of observation 119 feedings were noted, or an average of 17 feedings per hour, or 4¼ feedings per hour to each nestling. This would give for a day of 14 hours at least 238 insects eaten by the brood.

WHITE-CROWNED SPARROW (Zonotrichia leucophrys)

Length, 7 inches. The only similar Sparrow, the White Throat, has a yellow spot in front of eye.

Range: Breeds to tree limit in Alaska, Canada, the mountains of New Mexico, Colorado, Wyoming, and Montana, and thence to the Pacific coast; winters in the southern half of the United States and in northern Mexico.

Characteristics: This beautiful Sparrow is much more numerous in the Western than in the Eastern States, where, indeed, it is rather rare. In the East it is shy and retiring, but it is much bolder and more conspicuous in the far West, and there often frequents gardens and parks.

Like most of its family, it is a seed eater by preference, and insects comprise very little more than 7 per cent of its diet. Caterpillars are the largest item, with some beetles, a few ants and wasps, and some bugs, among which are black olive scales. The great bulk of the food, however, consists of weed seeds, which amount to 74 per cent of the whole. In California this bird is accused of eating the buds and blossoms of fruit trees, but buds or blossoms were found in only 30 out of 516 stomachs, and probably it is only under exceptional circumstances that it does any damage in this way. Evidently neither the farmer nor the fruit grower has much to fear from the White-crowned Sparrow. The little fruit it eats is mostly wild, and the grain eaten is waste or volunteer.

ENGLISH SPARROW (Passer domesticus)

Length, about 6¼ inches. Its incessant chattering, quarrelsome disposition, and abundance and familiarity about human habitation distinguish it from our native Sparrows.

Range: Resident throughout the United States, southern Canada, and to the Valley of Mexico.

Characteristics: Almost universally condemned since its introduction into the United States in 1851, the English Sparrow not only held its own, but increased in numbers and extended its range in spite of all opposition. This was due to the bird's hardiness, extraordinary fecundity, diversity of food, aggressive disposition, and almost complete immunity from natural enemies.

Its habits of driving out or even killing more beneficial species and, in rural districts, its destructiveness to grain, fruit, peas, beans, and other vegetables, are serious objections to this bird. However, since the automobile has so generally replaced horses, especially in towns, English sparrows have greatly decreased and they are now filling a niche in our bird fauna far more unobtrusively than during the period when they were establishing a footing on this continent. Now they are pests locally only and are giving much good service as destroyers of harmful insects.

CROW BLACKBIRD (Quiscalus quiscula and subspecies)

Length, 12 inches. Shorter by at least 3 inches than the other Grackles with trough-shaped tails. Black, with purplish, bluish, and bronze reflections.

Range: Breeds throughout the United States west to Texas, Colorado, and Montana, and in eastern Canada; winters in the southern half of the breeding range.

Characteristics: This Blackbird is a beautiful species, and is well known from its habit of congregating in city parks and nesting there year after year.

Like other species which habitually assemble in great flocks, it is capable of inflicting much damage on any crop it attacks, and where it is harmful a judicious reduction of numbers is probably sound policy.

It shares with the Crow and Blue Jay the evil habit of pillaging the eggs and young from the nests of small birds. Nevertheless it does much good by destroying insect pests, especially white grubs, weevils, grasshoppers, and caterpillars. Among the caterpillars are army worms and other cutworms.

When Blackbirds gather in large flocks, as in the Mississippi Valley, they may greatly damage grain, either when first sown or when in the milk. In winter they subsist mostly on weed seed and waste grain.

Dr. Chapman says of this Grackle that his disposition is as gloomy as his plumage is dark, but that as a parent he is beyond reproach, every moment being devoted to the care of his young, but it is all done in a joyless way.

CHIPPING SPARROW

ENGLISH SPARROW

WHITE-CROWNED SPARROW

CROW BLACKBIRD

HORNED LARK (Otocoris alpestris and subspecies)

Length, about 7¾ inches. The black mark across the breast and the small, pointed tufts of dark feathers above and behind the eyes distinguish the bird.

Range: Breeds from northern Alaska and Canada south to the Isthmus of Tehuantepec (except South Atlantic and Gulf States) and on mountains of Colombia; winters over most of breeding range.

Characteristics: Horned Larks frequent the open country, especially the plains and deserts. They associate in large flocks, are hardy, apparently delighting in exposed situations in winter, and often nest before snow disappears. The flight is irregular and hesitating, but in the breeding season the males ascend high in air, singing as they go, and pitch to the ground in one thrilling dive.

The preference of Horned Larks is for vegetable food, and about one-sixth of this is grain, chiefly waste. Some sprouting grain is pulled, but drilled grain is safe from injury. California Horned Larks take much more grain than the Eastern birds, specializing on oats, but this is accounted for by the fact that oats grow wild over much of the State. Weed seeds are the largest single element of food.

The insect food, about 20 per cent of the whole, includes such pests as May beetles and their larvæ (white grubs), leaf beetles, clover-leaf and clover-root weevils, the potato-stalk borer, nut weevils, bill-bugs, and the chinch bug. Grasshoppers are a favorite food and cutworms are freely eaten. The Horned Larks, on the whole, may be considered useful birds.

KINGBIRD (Tyrannus tyrannus)

Length, about 8½ inches. The white lower surface and white-tipped tail distinguish this Flycatcher.

Range: Breeds throughout the United States (except the southwestern part) and southern Canada; winters from Mexico to South America.

Characteristics: The Kingbird is a pronounced enemy of Hawks and Crows, which it vigorously attacks at every opportunity, thereby affording efficient protection to near-by poultry yards and young chickens at large. It loves the open country and is especially fond of orchards and trees about farm buildings.

No less than 85 per cent of the Kingbird's food consists of insects, mostly of a harmful nature. It eats the common rose chafer or rose bug, and, more remarkable still, it devours blister beetles freely.

This bird has been accused of eating honeybees to an injurious extent, but there is little ground for the accusation, as appears from the fact that examination of 634 stomachs showed only 61 bees in 22 stomachs. Of these, 51 were useless drones. On the other hand, it devours robber flies, which catch and destroy honeybees. Grasshoppers and crickets, with a few bugs and some cutworms, and a few other insects, make up the rest of the animal food. The vegetable food consists of fruit and a few seeds. The Kingbird deserves full protection.

ARKANSAS KINGBIRD (Tyrannus verticalis)

Length, 9 inches. The white edge of the feather on each side of the tail distinguishes this from all other Flycatchers except the gray and salmon-colored Scissortail of Texas.

Range: Breeds from Minnesota, Kansas, and Texas to the Pacific Ocean and from northern Mexico to southern Canada; winters from Mexico to Guatemala.

Characteristics: The Arkansas Kingbird is not so domestic as its Eastern relative and seems to prefer the hill country with scattered oaks rather than the orchard or the vicinity of ranch buildings, but it sometimes places its rude and conspicuous nest in trees on village streets.

This bird's yearly food is composed of 87 per cent animal matter and 13 per cent vegetable. The animal food is composed almost entirely of insects. Like the Eastern species, it has been accused of destroying honeybees to a harmful extent, and remains of honeybees were found to constitute 5 per cent of the food of the individuals examined; but nearly all those eaten were drones. Bees and wasps, in general, are the biggest item of food (38 per cent); grasshoppers and crickets stand next (20 per cent); and beetles, mostly of noxious species, constitute 14 per cent of the food. The vegetable food consists mostly of fruit, such as the elder and other berries, with a few seeds. This bird should be strictly preserved.

NIGHTHAWK (Chordeiles minor and subspecies)

Length, 10 inches. Not to be confused with the Whippoorwill. The latter lives in woodland and is chiefly nocturnal. The Nighthawk often flies by day, when the white bar across the wing and its nasal cry are distinguishing.

Range: Breeds throughout most of the United States, Canada, and mountains of northern Mexico; winters in South America.

Characteristics: The skillful evolutions of a company of Nighthawks as the birds gracefully cleave the air in intersecting circles is a sight to be remembered. So expert are they on the wing that no insect is safe from them, even the swift dragonfly being captured with ease. Unfortunately their erratic flight tempts men to use them for targets, and this inexcusable practice is seriously diminishing their numbers. This is deplorable, since no birds are more useful.

This species makes no nest, but lays its two spotted eggs on the bare ground, sometimes on the gravel roof of the city house.

The Nighthawk is a voracious feeder and is almost exclusively insectivorous. Some stomachs contained from 30 to 50 different kinds of insects, and more than 600 kinds have been identified from the stomachs thus far examined. From 500 to 1,000 ants are often found in a stomach. Several species of mosquitoes, including *Anopheles*, the transmitter of malaria, are eaten. Other well-known pests destroyed by the Nighthawk are the Colorado potato beetle, cucumber beetles, chestnut, rice, clover-leaf, and cotton boll weevils, bill-bugs, bark beetles, and squash bugs.

HORNED LARK

ARKANSAS KINGBIRD

KINGBIRD

NIGHTHAWK

AMERICAN MAGPIE (pica pica hudsonia)

Length, from about 18 to 21 inches. The black head and body and the white belly, white wing patches, and long tail are distinguishing features. The Yellow-billed Magpie is smaller, with a yellow bill.

Range: A characteristic Western species. Breeds from Aleutian Islands and Alaska, central Alberta, southern Saskatchewan, and Winnipeg Lake south to northern Arizona and New Mexico, and from the Cascades and Sierras to western North Dakota and western Texas; resident.

Characteristics: There are two species of Magpies, the Yellow-billed being confined to California, where it is very local. In general the habits of the two are similar. "Maggie," as this bird is familiarly known in the West, possesses dual traits. He is beautiful of plumage and adds much to the interest of the landscape as he flies from field to field, his long tail extending behind like a rudder.

Of eminently sociable disposition, this bird is rarely seen alone. He prefers flocks of family size to 50 and upwards. In more ways than one the Magpie is like the Crow and his sagacity has developed along much the same lines. In most localities he is suspicious and wary, as he has good cause to be, for he is not a favorite with either farmer or ranchman. He is eminently carnivorous, a carrion feeder by preference, an insect eater by necessity, and he performs good service in the latter rôle. He eats also many wild fruits and berries, but he is an incorrigible thief and well he knows his way to the poultry yard.

PHŒBE (Sayornis phœbe)

Length, about 7 inches. Distinguishing marks are the dusky-brown color, dark-brown cap, and white-margined outer tail feathers.

Range: Lives mainly in the east. Breeds from about middle Canada south to northeastern New Mexico, central Texas, northern Mississippi, and mountains of Georgia; winters from latitude 37 degrees to southern Mexico.

Characteristics: Few of our birds have won a more secure place in our hearts than plain little Phœbe, who has no pretentions to beauty of plumage or excellence of song. For this its confiding disposition and trusting ways are responsible, and many a farmer listens for its familiar voice in early spring and welcomes it back to its haunts in the old barn.

Originally building its nest on the face of cliffs, the Phœbe soon forsook the wilds for man's neighborhood, and year after year apparently the same pair returns to the identical rafter in the barn, the shelter of the porch, or the same nook under the footbridge, which it has claimed for its own for many seasons. The insistent call of "phœbe, phœbe," is as familiar as the pipe of the Robin.

The Phœbe is one of the most useful of birds, living almost wholly on insects, among which are many noxious kinds, as May beetles. Many Phœbes remain with us till late fall, and individuals may be seen lingering in sheltered places in the woods long after other Flycatchers have started for the Tropics.

BLUE-FRONTED JAY (Cyanocitta stelleri and subspecies)

Length, 11¾ to 13 inches. Easily distinguished from its fellows by its high crest, brownish-slaty foreparts, dark-blue wings and tail, and blue or whitish streaks on forehead.

Range: Resident in western North America from southern Alaska to Honduras.

Characteristics: The Blue-fronted Jays, of which the Stellar Jay may be taken as the type, are common inhabitants of the piny woods of both the Rocky Mountain and the Sierra Nevada States. They are among the handsomest of the family, the beauty of their plumage, their long erectile crests, and their insistent voices compelling attention.

Not being residents of cultivated districts, although they eat grain and small fruits, they do comparatively little damage. On the other hand, they do not do much good; for, although they are insect eaters, insects do not constitute a large part of their food, nor are the kinds they eat very important economically. Probably their most serious fault is a fondness for the eggs and young of small insectivorous birds, of which they destroy many in the course of the year. They share this failing with all other members of the family, and bird lovers must deem it a pity that such bold, dashing, handsome birds as the Jay should be so destructive to small but useful birds. This habit is all the more to be deplored inasmuch as when unmolested Jays readily respond to invitations to be neighborly, and willingly take up their abode near houses, where they never fail to excite admiration and interest.

WOOD PEWEE (Myiochanes virens)

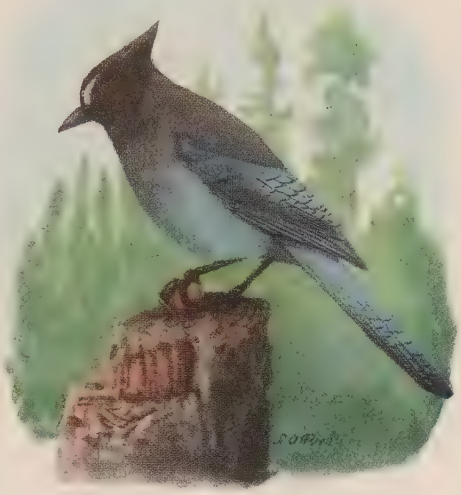
Length, about 6½ inches. Not readily distinguished by color, though darker than most other small Flycatchers, and with wing longer than tail.

Range: Breeds from Manitoba and southeastern Canada to southern Texas and central Florida; winters in Central and South America.

Characteristics: The Wood Pewee is clad in such modest garb and is of such retiring disposition that, were it not for its voice, it would often be passed unnoticed even by the most observant, especially as its home is in shaded glens or deep woods. Here the Wood Pewee pursues its vocation with a vigor worthy of all praise, and the snap of its mandibles as they close over some flying insect is often the only sound heard in the depths of the quiet forest.

There is little about the habits and make-up of this, or indeed of any of the Flycatchers, to suggest great constructive skill, but the nest of the Wood Pewee is a marvel of taste and ingenuity and, though much larger, suggests the dainty architecture of our Humming Birds. Like their fairy creations, the Wood Pewee's nest is covered with lichens and saddled neatly across a limb.

The food of this Flycatcher consists almost exclusively of insects and includes, among others, crane flies, beetles, dragonflies, ants, grasshoppers, caterpillars, and moths of many kinds. It also devours such pests as the weevils and many flies, including the house fly.



MAGPIES: BLACK-BILLED (upper) and YELLOW-BILLED (Lower)

BLUE-FRONTED JAY

PHOEBE

WOOD PEWEE

VESPER SPARROW (Pooecetes gramineus and subspecies)

Length, about 6 inches. Its white-tipped outer tail feathers distinguish this individual from its brown liveried fellows.

Range: Breeds from southern Canada south to Oregon, Arizona, Texas, Kentucky, Virginia, and North Carolina; winters from southern California, Texas, Missouri, and North Carolina to the Gulf coast and southern Mexico.

Characteristics: There is little about this brown-streaked Sparrow to attract attention and, until it flies and displays the white-tipped tail feathers, you might mistake the bird for any one of a half dozen of the Sparrow family. Indeed, if one catches merely a glimpse of a Vesper Sparrow crouched low and running swiftly through the grass one may be forgiven for mistaking the bird for a mouse.

It frequents open pastures and when singing likes to mount a rocky boulder so common in New England and other parts of the East. We are perhaps justified in calling its song its most notable characteristic. Though not a pretentious effort, the voice of the Vesper Sparrow is sweet and plaintive beyond expression, and harmonizes with the dying day as does the song of no other bird.

Prof. F. E. L. Beal records the fact that in winter the food of this Sparrow consists wholly of vegetable matter, while in summer it consists of little but insects. The Vesper Sparrow cares less for grass seed than any other of its fellows, but consumes great quantities of weed seeds. It eats also large numbers of grasshoppers, caterpillars, and weevils.

A number of these Sparrows taken in Utah, where the newly imported alfalfa weevil was doing much damage, were found to have eaten these weevils to the average extent of more than half their food. Thus the value of this bird to the farmer cannot be questioned.

BLUE GROSBEAK (Guiraca cærulea and subspecies)

Length, about 7 inches. Distinguished by its larger size from the Indigo Bird which alone resembles it.

Range: Breeds in the southern United States north to northern California, Colorado, Nebraska, southern Illinois, and Maryland, and south to Costa Rica; winters in Mexico and Central America.

Characteristics: One seldom sees the Blue Grosbeak at short range or under circumstances which make identification easy, as the bird is rather shy and frequents brushy thickets and viny tangles much as does the Indigo Bird. The low warbling song of this Grosbeak may be compared with that of the Purple Finch, but it is neither so loud nor so well sustained. Under the name of "Blue Pap," the Grosbeak used to be a favorite cage bird in Louisiana and other Southern States, where it is a rather common species.

In the matter of diet it shows a marked preference for insect food over vegetable, the proportion being about 67 to 33 per cent. The vegetable matter includes many weed seeds, as foxtail and bindweed.

CARDINAL (Richmondena cardinalis and subspecies)

Length, about 8¼ inches. Its size, crest, and bright-red color serve for instant identification.

Range: United States east of Great Plains (south of southern Iowa and central New York), southern Arizona, Lower California, and most of Mexico; mainly resident.

Characteristics: The Cardinal is a notable bird and any locality he chooses for his residence must be considered highly favored. His bright colors, trim form, and erectile crest, his clear whistling call, and his fine song are all to his credit. He is a resident of thickets and tangled undergrowth with hanging vines, and, when these are provided and he feels safe from the prowling cat and marauding Hawk, he will take up his abode in your garden or back yard as readily as anywhere else. Favor him further by supplying him food and water in winter and you make him your friend indeed. Practically, he is a resident wherever found, and the sight of his flashing red suit amidst snow-covered bushes is a memorable picture.

The Cardinal used to be a favorite cage bird in the Southern States, and the business of trapping him for market, especially about the large southern cities, was common. The bird is now protected by law as it should be, and the sight of a Cardinal behind prison bars has become rare indeed. How many thousands were sacrificed for hat gear we shall never know, but happily this practice has disappeared.

By preference the Cardinal is a vegetarian, and about seven-tenths of its food consists of vegetable matter in the form of seeds, berries, etc. But it also eats many insects, potato beetles, cotton worms, boll worms, cotton boll weevils, codling moths, and many others scarcely less noteworthy. Mr. W. L. McAtee, in attempting to sum up all the economic facts, declares that the bird does at least fifteen times as much good as harm, a record to be proud of.

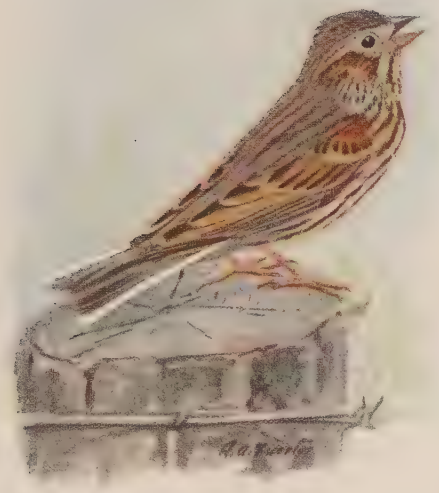
CALIFORNIA QUAIL (Lophortyx californicus and subspecies)

Length, about 9½ inches. Distinguished from Gambel's Quail by the reddish instead of black belly.

Range: Resident in the Pacific coast region from southwestern Oregon and western Nevada through California and Lower California.

Characteristics: The California Quail is one of our most beautiful game birds, and the sight of a large covey running daintily along, with crests nodding and fine plumage gleaming in the sun, is a sight to remember. Before Quail were so much persecuted coveys were common in the gardens of Oakland and other California towns, seemingly as much at home among calla lilies and rose bushes as in the stubble field. The numerous families in the fall then associated in bands of three or four hundred, or even more.

The California Quail has learned one lesson never acquired by our Bobwhite—to roost in trees and bushes instead of on the ground—and no doubt the safety thus obtained during the hours of darkness was one reason for its former great abundance.



VESPER SPARROW

CARDINAL:
Male, upper; female, lower

BLUE GROSBEAK:
Male, upper: female, lower

CALIFORNIA QUAIL

BREWER'S BLACKBIRD (Euphagus cyanocephalus and subspecies)

Length, 10 inches. Its glossy purplish head distinguishes it from other Blackbirds that do not show in flight a trough-shaped tail.

Range: Breeds in the West, east to Texas, Kansas, and Minnesota, and north to southern Canada; winters over most of the United States breeding range, south to Guatemala.

Characteristics: These birds are very numerous in the West. In the autumn they gather in immense flocks, especially about barnyards and corrals.

During the cherry season in California Brewer's Blackbirds are much in the orchards. In one case they were seen to eat freely of cherries; but when a neighboring fruit raiser began to plow his orchard almost every Blackbird in the vicinity was upon the newly opened ground and close at the plowman's heels in its eagerness to get the insects exposed by the plow. Caterpillars and pupæ form the largest items of animal food (about 12 per cent). Many of these are cutworms, while cotton bollworms or corn earworms were found in 10 stomachs and codling-moth pupæ in 11. Beetles constitute over 11 per cent of the food. The vegetable food is practically contained in three items—grain, fruit, and weed seeds. Grain, mostly oats, amounts to 54 per cent; fruit, largely cherries, 4 per cent, and weed seeds, not quite 9 per cent. The grain is probably mostly wild, volunteer, or waste, so that the bird does most damage by eating fruit.

CALIFORNIA JAY (Aphelocoma californica and subspecies)

Length, 12 inches. Distinguished from other Jays within its range by its decidedly whitish underparts and brown patch on the back.

Range: Resident in Pacific Coast States from southern Washington to southern Lower California.

Characteristics: This Jay has the same general traits of character as the eastern Blue Jay. He is the same noisy, rollicking fellow and occupies a corresponding position in bird society. Robbing the nests of smaller birds is a favorite pastime, and he is a persistent spy upon domestic fowls and well knows the meaning of the cackle of a hen. Not only does he steal eggs, but he kills young chicks.

The insect food of this Jay constitutes about one-tenth of its annual sustenance. The inclusion of grasshoppers and caterpillars makes this part of the bird's food in its favor. But the remainder of its animal diet includes altogether too large a proportion of beneficial birds and their eggs, and in this respect it appears to be worse than its eastern relative, the Blue Jay. While its vegetable food is composed largely of mast, at times its liking for cultivated fruit and grain makes it a most unwelcome visitor to the orchard and farm.

Over much of its range this Jay is too abundant for the best interests of agriculture and horticulture.

BULLOCK'S ORIOLE (Icterus bullocki and subspecies)

Length, about 8 inches. Our only Oriole with top of head and throat black and cheeks orange.

Range: Breeds from British Columbia, southern Alberta, and South Dakota to southern end of Mexican tableland; winters in Mexico.

Characteristics: In the West this bird takes the place occupied in the East by the Baltimore Oriole. In food, nesting habits, and song the birds are similar. Both are migratory and remain on their summer range only some five or six months. They take kindly to orchards, gardens, and the vicinity of farm buildings and often live in villages and city parks. Their diet is largely made up of insects that infest orchards and gardens. When fruit trees are in bloom they are constantly busy among the blossoms and save many of them from destruction.

In the food of Bullock's Oriole beetles amount to 35 per cent and nearly all are harmful. Many of these are weevils, some of which live upon acorns and other nuts. Ants and wasps amount to 15 per cent of the diet. The black olive scale was found in 45 of the 162 stomachs examined. Caterpillars, with a few moths and pupæ, are the largest item of food and amount to over 41 per cent. Among these were codling-moth larvæ. The vegetable food is practically all fruit (19 per cent) and in cherry season consists largely of that fruit. Eating small fruits is the bird's worst trait, but it will do this harm only when very numerous.

BLUE JAY (Cyanocitta cristata and subspecies)

Length, 11½ inches. The brilliant blue of the wings and tail combined with the black crescent of the upper breast and the crested head distinguish this species.

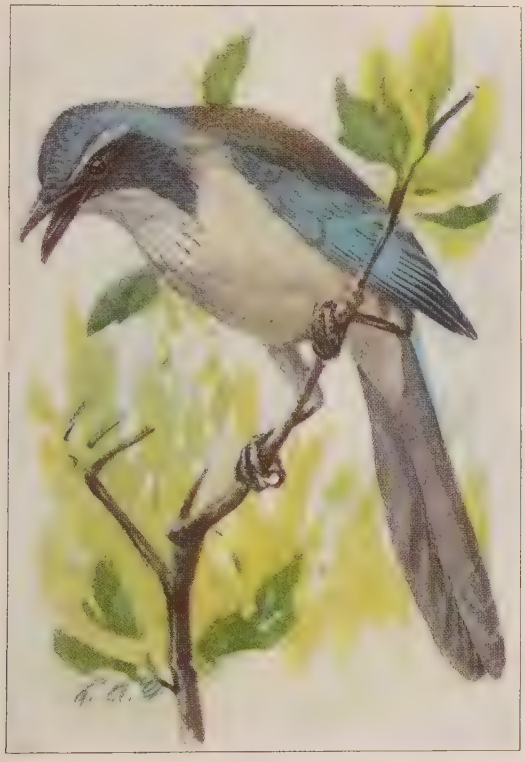
Range: Resident in the eastern United States and southern Canada, west to Alberta, Colorado, and Texas.

Characteristics: The Blue Jay is of a dual nature. Cautious and silent in the vicinity of its nest, away from it this bird is bold and noisy. Sly in the commission of mischief, it is ever ready to scream "thief" at the slightest disturbance. As usual in such cases, its remarks are applicable to none more than itself, a fact which neighboring nest holders know to their sorrow, for during the breeding season the Jay lays heavy toll upon the eggs and young of other birds, and in doing so deprives us of the services of species more beneficial than itself.

Approximately three-fourths of the annual food of the Blue Jay is vegetable matter, the greater part of which is composed of mast—that is, acorns, chestnuts, beechnuts, and the like. Corn is the principal cultivated crop upon which this bird feeds, but stomach analysis indicates that most of the corn taken is waste grain. Such noxious insects as wood-boring beetles, grasshoppers, eggs of various caterpillars, and scale insects constitute about one-fifth of its food.

BREWER'S BLACKBIRD

BULLOCK'S ORIOLE



CALIFORNIA JAY

BLUE JAY

VARIED THRUSH (Ixoreus nævius and subspecies)

Length, about 10 inches. Its large size and dark slate-colored upper parts, black breast collar, orange-brown stripe over eye, and orange-brown underparts distinguish this Thrush from all others.

Range: Breeds from northern Alaska, and Mackenzie delta south to northern California and Montana; winters from southern coast of Alaska to California.

Characteristics: This, one of our largest and finest Thrushes, is limited to the West coast, where it finds a congenial summer home in the depths of coniferous forests, the mystery and loneliness of which seem reflected in its nature.

Although the Varied Thrush somewhat suggests our Robin, it is much shier, and its habits and notes are very different, making it more nearly akin to the small Olive Thrushes. It nests in the conifers, and its eggs, unlike those of the Robin, are heavily blotched with brown. Its song, a single long-drawn note, has been highly praised and seems in harmony with its surroundings, being weird and inspiring.

In winter the Varied Thrush abandons the forest, and with it many of the habits of the recluse, and visits more open districts, including ravines and even gardens, where it becomes quite familiar.

This Thrush, like its smaller brethren, feeds chiefly on the ground, and its food is largely of a vegetable nature, but includes a fair proportion of insects, with millepedes and snails. Unless its habits are greatly modified by the encroachment of civilization on its domain, it is not likely to be much of a factor in agricultural affairs, but it will continue to make itself useful by destroying the insect enemies of forest trees.

VEERY (Hylocichla fuscescens and subspecies)

Length, about 7½ inches. To be known from the other small Thrushes by its uniform cinnamon-brown upper parts and its faint brown breast markings.

Range: Breeds from central Ontario and Newfoundland south to northern Illinois, northern Michigan, northern Ohio, and New Jersey, and in the Alleghenies south to North Carolina and northern Georgia; winters in South America.

Characteristics: Far more retiring than either the Wood Thrush or the Hermit, the Veery must be sought in the seclusion of the swamp or swampy woodland, far from the recesses of which he rarely ventures. Much of his time he spends on the ground, for on or near it he finds his chosen fare, which is similar to that of the other Thrushes, including wild fruits and insects.

Trim in form but clad in a garb of modest color as befits his nature, the Veery appeals less to the bird lover's eye than to his ear. Though some of his relatives are classed among the most famous of American songsters, the Veery may fairly claim place in the front rank, and his wild, mysterious, and all-pervading notes touch certain chords in the human breast which respond to the song of no other of our birds.

WOOD THRUSH (Hylocichla mustelina)

Length, about 8¼ inches. To be distinguished among its fellows by its more bulky form, by the golden-brown head, bright cinnamon upper parts, and the large round black spots beneath, sharply contrasting with the pure white.

Range: Breeds from southern South Dakota, central Minnesota, central Wisconsin, southern Ontario, and southern New Hampshire south to eastern Texas, Louisiana, and northern Florida; winters from southern Mexico to Costa Rica.

Characteristics: The Wood Thrush finds its way to our hearts and sympathies more through its voice than its presence, and whoever has failed to hear its clear, flutelike tones rising from the woodland depths as the mists of evening gather has missed a rich treat.

It is no doubt true that the Hermit Thrush is a more finished performer, but that chorister reserves his music chiefly for the northern wilds, while our Wood Thrush favors more southern lands. Moreover, the Hermit is a true recluse and must be sought in the deeper forests, its chosen home, while its more southern cousin lives in comparatively open woodland and does not disdain to take up its summer residence in parks and gardens. The music of the one is for the favored few, while the song of the other is almost as well known as that of the Brown Thrasher.

Like most of the tribe, the Wood Thrush obtains its food chiefly from the ground, where it spends much of its time searching among the leaves. Insects with a small percentage of fruit, chiefly wild varieties, compose its fare. Among the insects are cutworms and other caterpillars, ants, grasshoppers, and beetles. Thus the bird deserves a high place in our esteem for both esthetic and economic reasons.

BUSH TIT (Psaltriparus minimus and subspecies)

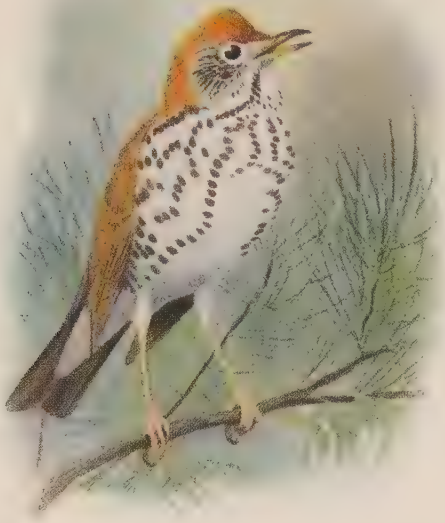
Length, from 4 to 4½ inches.

Range: Pacific coast from southern British Columbia to the Cape region of Lower California, and eastward to interior Oregon and California; nests generally throughout its range.

Characteristics: This pigmy among birds has many of the characteristic habits of the Chickadee family, of which it is the smallest member. Extremely sociable, Bush Tits move about in large flocks, occasionally in company with other birds, generally without. One moment you are alone, the next moment the trees and bushes are full of these diminutive little busybodies that scan you with their curious beadlike eyes as they hurry on in quest of food, keeping up the while a constant calling and twittering. Their pendent nests, often attached to oak trees, suggest the well-known structure of our Hangbird or Baltimore Oriole and are excellent specimens of bird architecture.

The few Western States favored by the presence of this bird are to be congratulated, as more than half its animal food consists of insects and spiders, nearly all of which are harmful.

VARIED THRUSH



WOOD THRUSH

VEERY

BUSH TIT

TOWHEE (Pipilo erythrophthalmus and subspecies)

Length, about 8¼ inches. Male mostly black, belly white; female, brown. Outer tail feathers of both white tipped.

Range: Breeds from Saskatchewan and southeastern Canada south to Florida and the Gulf Coast; winters from southeastern Nebraska and the Ohio and Potomac to the Gulf Coast.

Characteristics: The Towhee is a frequenter of second-growth and of scrub, and when the visitor enters such precincts he is pretty sure to hear the challenging cry, "chewink," and to catch sight of the bird as it hurriedly dashes into some brushy thicket as if in mortal terror.

The flight is hurried, jerky, and heavy, as if the bird were accustomed to use its wings only in emergencies. This is not far from being the case, as the Towhee sticks close to Mother Earth and uses its great strength and long claws to advantage in making the leaves and rubbish fly in its vigorous efforts to uncover its fare of seeds and insects.

The Towhee thus literally scratches for a living as no other of our birds does, except possibly the Brown Thrasher. The lazy man may well pass by the industrious ant and go to the Towhee for inspiration. No one waxes enthusiastic over its musical ability, but the song is given with such right good will that it is sure to satisfy the hearer as, no doubt, it does the bird himself.

The Towhee includes in its bill of fare wild fruit and berries, beetles and their larvæ, ants, moths, caterpillars, grasshoppers, and flies, and also in Texas the boll weevil.

ORCHARD ORIOLE (Icterus spurius)

Length, about 7¼ inches. Our only Oriole with black and chestnut markings; female grayish olive green.

Range: Breeds from North Dakota, Minnesota, Wisconsin, Michigan, southern Ontario, central New York, and Massachusetts south to northern Florida, the Gulf coast and southern Mexico, west to central Nebraska and western Kansas; winters from southern Mexico to northern Colombia.

Characteristics: Though clad in modest garb (for an Oriole) and in no respect a rival of the Baltimore, the Orchard Oriole has merits of his own. As his name implies, he is a lover of orchards, and I have always associated him with the glory and delicious perfume of apple orchards in full bloom.

Amidst such surroundings, the black and chestnut livery of the Orchard Oriole marks him as one of the princes of our bird world. Gardens and parks also know him well, and he is not adverse to swinging his nest, made chiefly of grasses, from the trees that shade the farmer's house. His nest betrays his connection with the family of Weavers, but his skill does not equal that of the Baltimore.

His song, like his dress, is modest, but it is exceedingly sweet, and one who hears it is sure to pause in his walk and wish that it were longer and given more frequently.

BROWN TOWHEE (Pipilo fuscus and subspecies)

Length, about 9 inches. The long tail and brown plumage distinguish these ground- and thicket-loving birds.

Range: Oregon and Colorado south to southern border of Mexican tablelands.

Characteristics: The Brown Towhees, of which the California form is a good type, are characteristic of the brushy canyons of the Far West, where they skulk and hide among the shrubbery and cactus much as do the common Eastern Towhees. Their powers of wing are not great and their long tails and heavy bodies render their flight very awkward. On the ground, however, they run with ease and speed.

In California, Brown Towhees are common in the parks and gardens, and in every way are very much more familiar than the related Towhee of the East. Like its Eastern cousin, it is much addicted to scratching among leaves and rubbish, for which work its stout legs and claws are particularly adapted.

The thin "tchip," which is the call note, seems out of all proportion, coming from such a stout, vigorous body. The birds of this group are not fine songsters, but their simple ditties are pleasant to hear in the waste places where they are generally found.

The Brown Towhee is much more of a vegetarian than an insect eater, and in California Professor Beal found that 85 per cent of its food consists of fruit, grain, and weed seeds.

BALTIMORE ORIOLE (Icterus galbula)

Length, about 7½ inches. The combination of black and orange marks this bird from its fellows.

Range: Breeds from central Saskatchewan and the southeastern provinces of Canada south to northern Texas, Louisiana, and northern Georgia, west to Montana, Wyoming, and eastern Colorado; winters from southern Mexico to Colombia.

Characteristics: Lord Baltimore was signally honored when one of our finest birds was christened with his name because it chanced to carry the family colors—black and yellow. Orioles are a tropical group and the luxuriant tropical forests are bright with the gleaming colors of many species of these beautiful birds. Only a few have found their way into the Temperate Zone, but not one of the tropical species is garbed in more tasteful dress than this exotic which has adopted the elms and sycamores of the Temperate Zone for its summer home.

When chill November winds have stripped our shade trees of their foliage then are revealed the long pendent nests, wrought with so much skill and patience by Madame Oriole, and we begin to realize how many of these birds summer with us. Suitable material for the Oriole nest is none too easily found, and the Weaver is not so fastidious that she will not accept strings and yarn of any color which are hung out for her convenience; so that at the end of the Oriole season the bird lover who is willing to cooperate with a pair of Nature's Weavers may fall heir to a nest made to order.

TOWHEE or CHEWINK:
Male, upper; female, lower

CALIFORNIA BROWN TOWHEE

ORCHARD ORIOLE:
Male, upper; female, lower

BALTIMORE ORIOLE:
Male, upper; female, lower

TREE SWALLOW (Iridoprocne bicolor)

Length, about 6 inches. The steel-blue upperparts and pure white underparts are distinguishing characteristics.

Range: Breeds from northwestern Alaska and northern Canada south to southern California, Colorado, Kansas, Missouri, and Virginia; winters in central California, southern Texas and Gulf States, and south to Guatemala.

Characteristics: In its primitive state the Tree Swallow used to nest in hollow trees, and in some parts of the country it still continues to do so. Early in the settlement of the country it saw the advantage of putting itself under man's protection, and now no bird is quicker to respond to an invitation to nest in a box dedicated to its use.

The bird lover within the range of this species may obtain an interesting tenant or two by the expenditure of a little trouble and labor, since the bird is not a bit fastidious as to its domicile, provided it is weather-tight. Tree Swallows arrive from the south early in April and soon begin to nest. In the fall they gather in great flocks preparatory to their departure, and may then be seen by hundreds perched on telegraph wires.

As is the habit with Swallows generally, Tree Swallows migrate by day, feeding as they go, and a flock passing swiftly south presents to the casual observer an everyday appearance well calculated to deceive. Watch the flock as it crosses the road and passes from field to field and you will notice that while the line of flight has many a twist and turn it trends steadily to the south, and that no individual takes the back track.

The Tree Swallow consumes vast numbers of gnats, flying ants, beetles, mosquitoes, and other flying insects. It exhibits a curious departure from the traditions of its kind in that it appears to be very fond of the berries of the bayberry or wax myrtle. It also often chooses these bushes for a roosting place at night.

SCARLET TANAGER (Piranga olivacea)

Length, about 7¼ inches. The scarlet coat and black wings and tail distinguish this bird.

Range: Breeds from southeastern Canada to southern Kansas, northern Arkansas, Tennessee, northern Georgia, and mountains of Virginia and South Carolina; winters from Colombia to Bolivia and Peru.

Characteristics: The Tanagers are strictly an American family, and, as their bright colors might seem to suggest, they originated in the Tropics to which most of the numerous species are confined. In fact, the gleam of scarlet from the coat of this Tanager in our somber woods always seems a little out of place, as if the bird were an alien. But it is wholly at home with us, and does not hesitate to make its summer residence still farther north in Canada.

Curiously enough, the nearest relatives of the brilliant Tanagers are the plainly colored Sparrows. The chirp-churr of the Tanager is a familiar call note in our northern woods, while its song is one of the sweetest.

CLIFF SWALLOW (Petrochelidon albifrons and subspecies)

Length, about 6 inches. The rufous upper tail coverts serve to distinguish this Swallow from other species.

Range: Breeds from central Alaska and northern Canada south over the United States (except Florida) to Guatemala; winters in South America.

Characteristics: The Cliff and the Barn Swallow are members in good standing of the original guild of masons, and their clever constructive work in nest building with mud pellets will bear the severest professional inspection. Through much of the West, the Cliff Swallow still attaches its mud house to the faces of cliffs as from time immemorial, and it was not until the farmer's house and barn offered a satisfactory substitute for granite and sandstone bluffs that the bird became really numerous in our Eastern States. In some localities this Swallow is not a welcome guest about the homestead, as its nest is apt to contain parasites which the good housekeeper fears. Such parasites, however, are not to be dreaded, as they will live only on birds.

The Cliff Swallow performs invaluable service to man, since its food consists wholly of insects, and among them are many pestiferous kinds such as leaf bugs, leaf-hoppers, and the boll weevil. Whoever, then, protects this and other species of Swallows does good and patriotic service and can, moreover, be sure of adequate reward.

WESTERN TANAGER (Piranga ludoviciana)

Length, about 7 inches. The combination of orange-red head, black back, and yellow underparts is distinctive.

Range: Breeds from northeastern British Columbia, southwestern Mackenzie, and southwestern South Dakota to the mountains of southern California and New Mexico; winters from central Mexico to Guatemala.

Characteristics: Discovered in Idaho by Lewis and Clark in 1806, this Tanager has thus been known more than a hundred years, in which time it has become one of the most familiar of Western birds. It is an inhabitant of both the western Rocky Mountains and the Sierra Nevada, and is at home among pine woods of which it is the brightest ornament.

In general its habits are like those of its scarlet cousin, and it also has a sweet song very similar in general effect. In California this Tanager has acquired an evil reputation by attacks on the cherry crop, and there is no doubt that when it assembles in large numbers in the fruit districts it is the cause of heavy loss to small fruit growers. Under ordinary circumstances, however, the greater part of its food consists of insects, many of them harmful. Two very injurious families of beetles, whose larvæ are wood borers and do much damage to trees and other plants, are represented in the food. The planting of berry-bearing trees near the orchard would no doubt prevent much of the loss occasioned by this bird, which by no means occurs every year.

TREE SWALLOW

CLIFF or EAVES SWALLOW

SCARLET TANAGER:
Male, upper; female, lower

WESTERN TANAGER:
Male, upper; female, lower

INDIGO BUNTING (Passerina cyanea)

Length, about 5½ inches. The male is easily identified by the rich blue color, with black wings and tail. The female is warm brown.

Range: Breeds from eastern North Dakota, central Minnesota, northwestern Michigan, southern Ontario, and southern New Brunswick to central Texas, southern Louisiana, central Alabama, and central Georgia; winters from southern Mexico to Panama.

Characteristics: The Indigo Bird is the brightest colored Sparrow that visits the north, but one can hardly believe that the sprightly dandy, clad in his rich blue suit, is the mate of the inconspicuous brown bird that seeks assiduously to conceal herself in the leafy cover, as though a bit ashamed of the contrast between her working suit and the holiday garb of her spouse.

The Indigo is a frequenter of sprout land, of brushy thickets, and of open woodland, and the male is fond of singing his cheerful lay from the topmost twig of a tall shrub or tree, as though challenging the world to produce his equal. For such a dainty bird, the nest is a singularly inartistic structure and very carelessly built. It is placed in the crotch of some low leafy bush and is not at all difficult to find.

The fine feathers of the male are not the only claim of the Indigo Bunting to our interest. Its food consists largely of weed seed, but it eats many insects, including a goodly proportion of grasshoppers and caterpillars.

LAZULI BUNTING (Passerina amœna)

Length, from 5¼ to 5½ inches. Male blue above, breast brownish; wing bars white; female brownish.

Range: Breeds from southern British Columbia, southern Alberta, southeastern Saskatchewan, and western North Dakota to southern California and southwestern Texas; winters in Mexico.

Characteristics: The Lazuli Finch is a near relative of the Indigo Bunting and the Nonpareil, and its habits are in a general way very similar. There is the same disparity between the dress of the sexes, the color of the female being comparatively dull and homely. The male, however, is a gay-plumaged dandy in his suit of turquoise blue, and is likely to surprise the stranger who meets him for the first time, since his colors suggest a tropical setting and are somewhat out of keeping with his surroundings.

Notwithstanding his fine feathers, he is not so fond of displaying himself as is his cousin, the Indigo Bird, but seems to think that the cover of brush and chaparral is essential to his safety. His song is vivacious and pleasing and the Easterner who hears it for the first time will have no difficulty in guessing at the identity of the chorister, from the resemblance of his lay to the cheerful ditty of the Indigo Bunting.

WHITE-THROATED SPARROW (Zonotrichia albicollis)

Length, about 6¾ inches. The white throat and yellow before the eye are its distinguishing colors.

Range: Over most of eastern North America. Breeds in much of Canada south to southern Montana, central Minnesota, central Wisconsin, and in the mountains of northern Pennsylvania, New York, and Massachusetts; winters south of the Ohio to northeastern Mexico.

Characteristics: This is one of the bird lovers' favorites, as well it may be. Its beautifully variegated plumage, its jaunty ways, its familiarity, and its sweet and plaintive whistle all combine to commend the bird to our interest. In the fall it comes to us in large flocks associated with other species, especially Juncos and various other Sparrows. The "Peabody Bird" is singularly prodigal of its sweet song, and the young White-throats begin to try their voices in the fall as if practicing for the more exacting demands of spring. When a number join in the fall chorus the result is unusually sweet and inspiring.

Many a camper in the north woods, as he lies in his blanket under the stars, pays tribute to the sweet voice of this songster, as it is borne on the midnight air from some leafy retreat.

The food habits of this Sparrow give it a place among the farmer's friends. It is a great destroyer of weed seed and is especially fond of those of ragweed and bindweed. In the Cotton Belt, where many White-throats winter, it includes among its insect food the boll weevil.

SLATE-COLORED JUNCO (Junco hyemalis and subspecies)

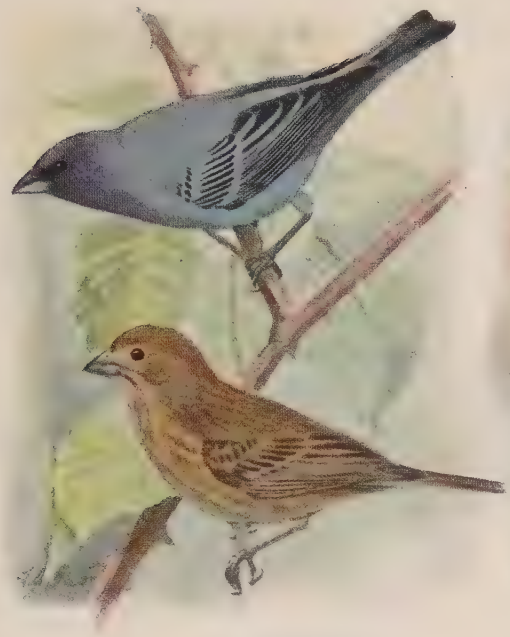
Length, about 6¼ inches. Prevailing color grayish slate, belly white; outer tail feathers tipped with white.

Range: Breeds in much of Alaska, Canada, and in the mountains of the entire United States and Lower California; winters in southern Canada, the United States, and northern Mexico.

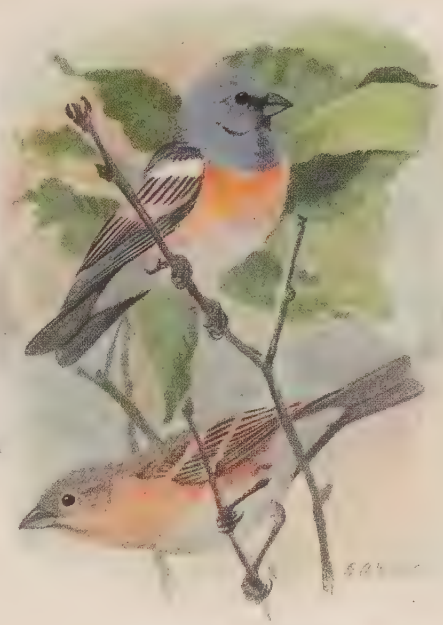
Characteristics: Only one Junco inhabits the eastern United States, but several species live in the West. All of the members of the group resemble each other in a general way and all have similar habits. Most of us know the Junco only in the fall when, after having summered in the mountains of the more northern districts, the birds gather in large flocks and forsake high altitudes for more congenial surroundings. The Junco associates with other Sparrows, usually far outnumbering them, but its slate-colored plumage and white tail feathers reveal its presence unmistakably. Its familiar "tsip" may be easily recognized among the medley of notes, but its low sweet song is to be heard at its best only in its alpine home.

When snow is on the ground, the Juncos are often hard pushed for food, and on such occasions a flock will readily respond to an invitation to visit the dooryard and dine on table crumbs or small seeds of any kind.

The Junco is one of our most persistent grass and weed seed eaters and in winter and spring seeds constitute much the greater part of its fare.



INDIGO BUNTING:
Male, upper; female, lower



LAZULI BUNTING:
Male, upper; female, lower

WHITE-THROATED SPARROW

SLATE-COLORED JUNCO

BLACK FLYCATCHER; PHAINOPEPLA (Phainopepla nitens and subspecies)

Length, about 7½ inches. The glossy black color and marked crest of the male and the brownish gray of the female, also crested, distinguish this species.

Range: Breeds from central California, Nevada, Utah, and southwestern Texas, southward to Cape St. Lucas and Valley of Mexico; winters from southern California southward.

Characteristics: Though a distant relative of the Cedar Bird, the Phainopepla differs markedly from that species both in appearance and habits. It is known to few, for it lives chiefly in the desert country of the Southwest, though it is not wholly a stranger in the parks and gardens of that region.

When flying the white wing-patch becomes conspicuous and distinguishes the bird from all others. In the fall it is not unusual to find it in loose flocks the members of which are drawn together temporarily, perhaps by the abundance of some favorite food.

Like the Cedar Bird, it is essentially a berry eater, and in California sometimes makes free of the cherry crop. Its chief dependence, however, is the mistletoe, the mucilaginous berries of which delight it, as also do those of the juniper and pepper. Its partiality for mistletoe is probably the bird's worst trait, as it distributes the seeds of this pernicious parasite to the detriment of many fine oaks and sycamores.

It eats many insects, principally ants, and has the habit of perching on a tall shrub, from which it sallies forth after flying insects, thus simulating a Flycatcher. The Phainopepla has a variety of call notes and a very pleasant song.

YELLOW-THROATED VIREO (Lanivireo flavifrons)

Length, about 6 inches. Its green upper parts and bright-yellow throat and upper breast are its identification marks.

Range: Breeds from southern Canada (east of Rocky Mountains) south to central Texas, central Louisiana, and central Florida; winters from southern Mexico through Central America to Colombia.

Characteristics: By no means so common as the Red-eye, the Yellow-throat inhabits the same kind of woodland tracts and, like it, may often be seen, and still oftener heard, in the trees that shade the village or even the city streets. It is, however, much less common in such places since the advent of the English Sparrow, having been driven away by that little pest. Its song is much like that of the Red-eye, yet it has a rich throaty quality quite foreign to the notes of that tireless songster and far superior to them. Neither this nor indeed any of the Vireos ever seem to be in a hurry. They move quietly through the leafy covert, scanning the most likely lurking places for insects, pausing now and then to sing in a meditative manner, then renewing their quest. All of which is very different from the busy, nervous movements of the Wood Warblers that seem ever in haste as if time were too precious to waste.

The food of the Yellow-throat consists largely of caterpillars, moths, beetles, flies and mosquitoes.

RED-EYED VIREO (Vireosylva olivacea)

Length, about 6¼ inches. The slaty-gray crown, inclosed by narrow black lines, serves to identify this Vireo.

Range: Breeds from central Canada south to southeastern Washington, southern Montana, eastern Wyoming, eastern Colorado, northern Coahuila, and central Florida; winters in South America.

Characteristics: The Red-eye is one of the commonest, not only of our Vireos, but also of all our small birds, and inhabits every suitable piece of woodland throughout its territory. Its notes may be frequently heard coming from the village shade trees; city parks and streets also know it. Its most notable trait is its habit of singing almost continuously as it moves slowly through the branches, pausing now and then to pick up a caterpillar or other insect.

In woods where these Vireos are common its voice may be heard all the livelong day, even during the noon hours, when most birds are silently resting.

The nest, suspended in a V-shaped fork, is a beautiful specimen of avian architecture, and so indifferent is the bird to its location that the nest of no other bird is so frequently seen by the chance passer-by.

Though fond of mulberries and sassafras berries, the Red-eye eats insects by preference, and spends most of its time gleaning the branches for plant lice, scales and caterpillars of various kinds. It eats such harmful beetles as the long-horned borers and weevils. I once saw a Red-eye with a full-grown luna moth in its bill. After vigorously beating the helpless moth on a limb to get rid of the wings, the bird succeeded in reducing the enormous body to a formless mass which it swallowed.

LARK SPARROW (Chondestes grammacus and subspecies)

Length, about 6¼ inches. The variegated head markings and white outer tail feathers distinguish this species.

Range: Breeds from western Pennsylvania, western Maryland, and the Mississippi Valley westward, and from southern British Columbia and southern Ontario to central Alabama, northern Louisiana, Texas, and the Mexican tableland; winters from northern California, southern Texas, and southern Mississippi to Guatemala.

Characteristics: With some of the habits of the Grass Finch and, like that species, having the tail feathers tipped with white, the Lark Sparrow yet possesses distinctive traits of its own, and after a little scrutiny can be mistaken for no other species. Its peculiar head markings have suggested the local Western name of "Snake Bird," although the reason is not quite obvious. The Lark Finch is usually very abundant where found at all, and inhabits the open country, prairie, plain, and desert. It is a fine songster and the possession of a musical voice has led to its capture and sale as a cage bird.

It has peculiar claims on the interest of the Western farmer, since it is in the front rank of Sparrows as a destroyer of grasshoppers.

BLACK FLYCATCHER or PHAINOPEPLA:
Female, upper; male, lower

RED-EYED VIREO

YELLOW-THROATED VIREO

LARK SPARROW

HOUSE FINCH (Carpodacus mexicanus and subspecies)

Length, about 6 inches. Grayish brown above, many feathers tinged with red. Below dull white; crown, rump, and throat crimson.

Range: Resident in Oregon, Idaho, and southeastern Wyoming south to Lower California and southern border of Mexican tableland.

Characteristics: The pretty little House Finch of the Far West is among the most domestic of American birds, and exhibits a predilection for the neighborhood of houses almost as strong as that of the English Sparrow. It carols its sprightly lay from the tops of buildings in villages and even in cities, and from the shrubbery of lawn and park. So confiding has the bird become that it places its nest in any crack or cranny of house or outbuilding that is large enough for its housekeeping operations. When such retreats are not to be had it builds a bulky nest in a tree or bush.

It is fond of fruit, including pears, cherries, and small fruit, which its strong conical bill enables it to break open with ease. Therefore, it is a good deal of a pest and does considerable damage to fruit crops. Much, however, can be said in mitigation of its offenses. The seeds of plants, a large proportion of those of noxious weeds, constitute seven-eighths of its food for the year. Plant lice, which are notoriously harmful to many trees and plants, also are a favorite diet. So, too, are caterpillars and beetles; therefore, the balance is decidedly in the bird's favor.

This attractive songster was carried to the Hawaiian Islands years ago and now is numerous in Honolulu and also in the forest on the island of Hawaii, where amid brighter and more tropical neighbors it seems curiously out of place, though it sings as often and as joyously as in its old haunts across the Pacific.

ARKANSAS GOLDFINCH (Astragalinus psaltria and subspecies)

Length, about 4½ inches. Upper parts olive green, more or less mixed with black in the subspecies; underparts yellow.

Range: Breeds from southern Oregon, Utah, and northern Colorado to southern Lower California, Colombia, and Peru; winters from southwestern United States south.

Characteristics: In the Far West this Goldfinch takes the place of the Eastern Goldfinch which in a general way it much resembles in habits. Like that bird, it is rarely seen, save in the breeding season, except in small parties, the members of which seem to be on terms of the utmost familiarity and accord.

The flight of this species, as of its kindred, is exceedingly characteristic. It disdains to cleave the air in straight lines, but progresses in a series of graceful, sinuous curves, which, however, take the little aëronaut rapidly from point to point. This flight is a sure mark of identification. The bird has a sweet warbling song and even its call notes are plaintive and pleasing. It abounds in orchards and gardens and is often to be seen by the roadside gleaning food from the stems of thistles or sunflowers.

PURPLE FINCH (Carpodacus purpureus and subspecies)

Length, about 6 to 6¼ inches. Unlike any other Eastern Finch, the crimson head of the male sufficiently distinguishes it.

Range: Breeds in southern Canada and southward to California, North Dakota, Minnesota, Illinois, Pennsylvania, and northern New Jersey; winters from somewhat north of the southern boundary of its breeding range to the Gulf States and southern California.

Characteristics: Considering that it is common and widely distributed, the Purple Finch is not so well known as it should be. For one thing it has a marked liking for the tops of trees, particularly elms, and when in a tree-top and more or less screened by foliage it requires the aid of a good glass to make its identity sure.

Its warbling song is sweet and melodious, but is all too brief for perfect enjoyment, though in spring the bird is prodigal enough of its carols, and not infrequently a dozen males may be heard singing at once in the same or in contiguous trees. It frequently nests around houses and for a site is very partial to the Virginia juniper.

The Purple Finch lives almost entirely on the seeds of various plants, including those of false buckwheat and ragweed, with some wild berries. It is accused, not without reason, of being a confirmed budder of fruit and other trees, but the damage it inflicts on Eastern orchards appears to be very slight, if indeed the modest budding it does is an injury at all.

AMERICAN GOLDFINCH (Astragalinus tristis and subspecies)

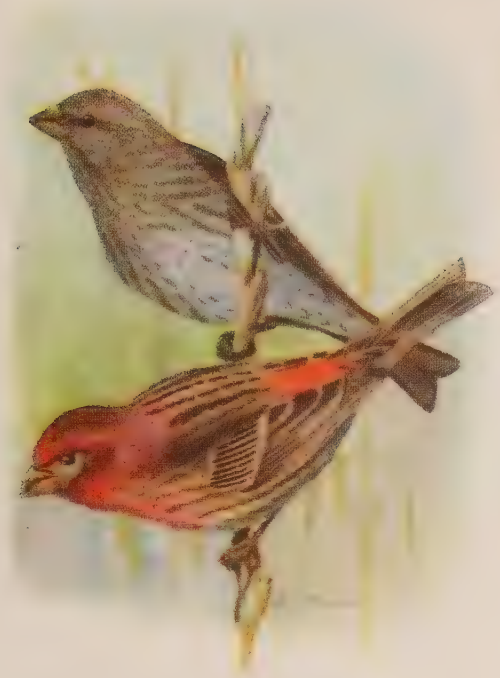
Length, about 5 inches. Easily distinguished by its rich yellow plumage and black crown and tail.

Range: Breeds from southern Canada south to southern California, southern Colorado, Arkansas, and northern Georgia; winters south into Mexico.

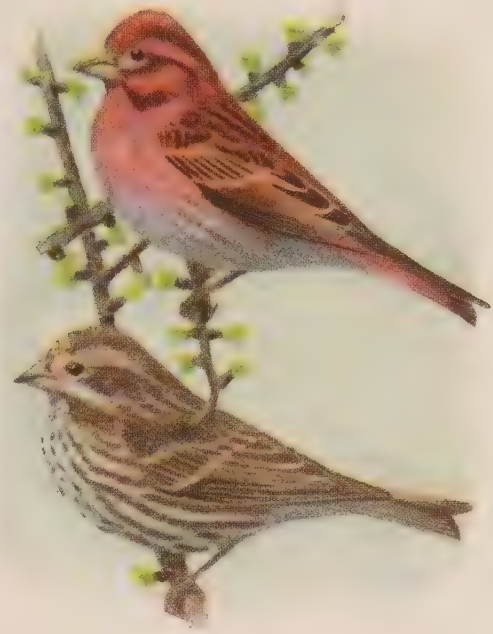
Characteristics: The Thistle Bird is one of our best-known Finches, being not only common, but very sociable. It usually goes in small flocks, or family parties, and sometimes the tall thistles on which it likes to feed bend with the united weight of several of the gay-plumaged little Goldfinches. It is a law unto itself as regards its nesting period, and begins to think seriously about housekeeping when other birds are feeding full-grown youngsters or are debating the propriety of a second brood.

The Goldfinch has a pretty and plaintive call note, and its full song is well worth listening to. It is much like that of the Canary, so much alike, in fact, that the bird is often called the Wild Canary.

Throughout the year the Goldfinch is a seed eater, especially of weed seeds, and it eats also many insects, including cankerworms, plant lice, and beetles. Our Goldfinch sometimes annoys the farmer by attacking the lettuce seeds which have been left to mature for next season's planting, but the damage in this way is slight, and it is said that even on the large seed farms of California it is never serious enough to call for protective measures.



HOUSE FINCH:
Female, upper; male, lower



PURPLE FINCH:
Male, upper; female, lower

ARKANSAS GOLDFINCH:
Male, upper; female, lower

AMERICAN GOLDFINCH:
Male, upper; female, lower

RUBY-THROAT (Archilochus colubris)

Length, about 3¾ inches. Needs no description, as it is the only Hummer living in the Eastern States.

Range: Breeds from southeastern Saskatchewan and central Quebec south to Gulf coast, west to North Dakota, Nebraska, Kansas, and central Texas; winters from middle Florida and Louisiana through southern Mexico and Central America to Panama.

Characteristics: Of the five hundred or more species of this strictly American family, the eastern United States is favored by the presence of only one, the Ruby-throat, nor is this species as common as might be desired. Compared to the abundance of its kind in the Far West it is rare indeed.

As if afraid of being too prodigal of her gifts, Nature has denied the Humming Bird song, and the harsh squeaks of these tiny sprites are far better adapted to making war than love. Truth is, the Hummer has a sharp temper and not only engages in warfare with its own kind, but attacks any bird, however large, that ventures to dispute its territorial rights. These are not small, for in its own estimation it is "Lord of all it surveys."

The male is an inconstant swain and no sooner is the nest made—and in the making he takes no part—and the eggs laid than he departs, leaving the housekeeping to his erstwhile mate.

While the nectar of flowers is taken in large quantities, a creature so vivacious as the Hummer could hardly sustain life on diet so thin, and the bird adds to its fare a liberal supply of minute insects and spiders of various sorts.

WHIPPOORWILL (Antrostomus vociferus and subspecies)

Length, about 10 inches. Not to be confused with the Nighthawk, which flies by day and has white wing bars, while the Whippoorwill is crepuscular and nocturnal.

Range: Breeds from the Atlantic to the Plains and in the mountains of New Mexico, Arizona, and northern Mexico and from Manitoba and the eastern Canadian Provinces to Louisiana, Mississippi and Georgia; winters from South Carolina and the Gulf States to Salvador.

Characteristics: This bird of the night, whose day begins with the going down of the sun when the Nighthawk's ends, is common throughout the East in open woodlands, on the edges of which it likes to hunt. It dozes away the hours of daylight squatting on the ground among the leaves where its marvelous protective coloration affords it safety.

No sooner have the shadows lengthened, however, than it becomes active and its characteristic note resounds through the forest glades. So plaintive is its cry and so mysterious its comings and goings that in the minds of many its notes are associated with misfortune, as a death in the house near which it persistently calls. Its two eggs are laid among the leaves, needing no other protection than the cover of the mother's body. The Whippoorwill may be accounted one of our most efficient insect destroyers, as its capacious mouth beset with bristles, a regular insect trap, would suggest.

RUFOUS HUMMING BIRD (Selasphorus rufus)

Length, from 3¼ to 3¾ inches. The reddish-brown body color, red and green gorget, and the notch in tail feathers serve to distinguish this species from our other Hummers.

Range: Breeds from the Alaskan coast, east-central British Columbia, and southern Alberta south to the mountains of central California and New Mexico; winters in southern Mexico.

Characteristics: One can but wonder at the hardihood of this little wanderer from the Tropics in including in its summer itinerary a journey to distant Alaska. It reaches a latitude of 61°, much farther north than any other of its kind. In favored glades of the forests in the Rocky Mountains and the Sierras during the migration this and other species of Hummers are to be seen literally by hundreds.

The Rufous Hummer has temper and courage to match its fiery hues, and spends no small part of its time doing battle with its fellows. The contestants after several fierce rounds fly away not only fit, but eager for another fray. In addition to the nectar of flowers, its standard fare, this Hummer includes in its diet "honey dew," the sugary secretion of plant lice which is deposited on vegetation. Like all other Hummers, it eats large numbers of minute insects which it finds inside the flowers.

It is interesting to note that Humming Birds discover the flowers they frequent by sight alone, and any bit of bright color in the distance is sure to attract their notice, such as a bright-red handkerchief on a bush or about the neck. More than once I have observed them poising within a few inches of my head, evidently endeavoring to ascertain the nature of the red handkerchief I wore.

ROAD RUNNER (Geococcyx californianus)

Length, 20 to 24 inches, mostly tail. Quite unlike any other North American bird in form and color.

Range: From the upper Sacramento Valley south through Lower California, and from Colorado, Kansas, middle and western Texas, Arizona and New Mexico to Puebla, Mexico; resident.

Characteristics: The name "Road Runner" when applied to a Cuckoo may seem an anomaly to those who know only our Eastern Cuckoos, but in truth the Road Runner is anomalous in many ways. It is distinguished by curiously marked plumage, the possession of a long bill and a disproportionally long tail.

As a result of its strange appearance, and stranger antics, the Road Runner is made the hero of many a fable. Among other wonders, it is claimed that it can outrun the swiftest horse and kill the biggest rattlesnake. It is said to accomplish the latter feat by surrounding the reptile while asleep with a rampart of cactus spines on which the enraged snake accommodatingly impales itself.

The truth is that when in a hurry this ground Cuckoo can run with great speed, though as yet no record of its best time has been made. Its food consists of a great variety of harmful insects, mice, lizards, and small snakes.

RUBY-THROATED HUMMING BIRD:
Male, upper; female, lower

RUFOUS HUMMING BIRD:
Male, upper; female, lower

WHIPPOORWILL

ROAD RUNNER

GREAT HORNED OWL (Bubo virginianus and subspecies)

Length, about 22 inches. The great size and long ear tufts sufficiently distinguish this Owl.

Range: Resident over the greater part of North and South America.

Characteristics: This, our largest Owl, inhabits heavily forested and unsettled regions and is becoming more and more rare in thickly populated areas. It is well known by its far-reaching call—"hoo-hoo-hoo-hoo"—which is heard best in the still small hours of the night, when it echoes across the expanse of canyon and forest in the Far West.

This Owl destroys many Partridges and other game birds, and unhoused poultry is never safe from its nocturnal attacks. Its deeds are those of darkness, since usually it hunts only at night, though when disturbed in the daytime it can see well enough to take good care of itself. Its bill of fare is a long one and includes many kinds of mammals and birds. It is one of the few creatures which when hungry do not hesitate to attack the skunk, and it appears to have no great difficulty in killing this rather formidable little beast. That it does not always do so with entire impunity is evident from the odor frequently attaching to its feathers. Its destruction of rodents entitles it to our gratitude, especially when it kills pocket gophers, rats, mice, ground squirrels, and rabbits.

COOT (Fulica americana)

Length, about 15 inches. The slate-colored plumage, with blackish head and neck, white bill and scalloped toes, mark this bird apart from all others.

Range: Breeds from southern Canada south to Lower California, Texas, Tennessee, and New Jersey; also in southern Mexico and Guatemala; winters from southern British Columbia, Nevada, Utah, Ohio Valley, and Virginia south to Colombia.

Characteristics: The Coot, or Mud Hen, is a sort of combination of Duck, Gallinule, and Rail, and withal is a very interesting bird. Fortunately for the Coot, its flesh is little esteemed, although most who have tried it pronounce it very good. The Coot is thus passed by in contempt by most sportsmen, and in some regions it is as tame as can well be imagined, swimming within a few feet of the observer with entire unconcern. Under other circumstance, however, as in Louisiana, where it is shot for food under the name *Poule d'Eau*, it becomes as wild as the most wary of Ducks. It frequents both salt and fresh water, preferably the latter.

Under protection of recent years Coots have multiplied greatly in many places. The Mud Hen is one of the few American birds that occasionally visits the distant Hawaiian Islands in fall and winter. Finding conditions to their liking, some of the immigrants, probably centuries ago, elected to remain and found a new colony. In the freshwater ponds of the island archipelago, their descendants still live and thrive.

The food of the Coot consists almost entirely of water plants of no use to man.

CEDAR WAXWING (Bombycilla cedrorum)

Length, about 7¼ inches. Known from every other American bird, except its larger cousin, the Bohemian Waxwing, by its crest, grayish-brown upper parts, yellow tail band and sealing-waxlike tips to secondaries and, sometimes, to tail feathers.

Range: Breeds from central British Columvia, Alberta, southern Keewatin, northern Ontario and northwestern Quebec south to southern Oregon, northern New Mexico, Kansas, northern Arkansas, and North Carolina; winters over most of United States and southward to Mexico and Panama.

Characteristics: In clothing the Cedar Bird, Mother Nature essayed her very best and reached the limit of quiet elegance. As if aware of the distinction conferred by its smooth, delicately tinted plumage, the Waxwing has the air of a well-bred aristocrat, and comports itself with a dignity that is very impressive. Why this beautiful creature should be denied a voice is a mystery, but, with the exception of the faintest kind of a whistle and a few low notes, seldom heard, the bird is silent.

Except during the nesting season, which is very late, the bird is a wanderer, moving about the country in flocks and remaining a shorter or longer time in a given locality according to the abundance of food. The Waxwing is a berry eater and its local name of "Cherry Bird" indicates that it by no means disdains cultivated varieties. Fortunately the bulk of the fruit it takes consists of wild species, especially in winter, when cedar berries are greedily devoured. In the West it includes in its bill of fare mulberries and pepper berries. While insects constitute only a comparatively small percentage of its diet, those eaten include very destructive species, such as the elm beetle.

SPOTTED SANDPIPER (Actitis macularia)

Length, about 6 inches. The "Tip-up," with its brownish-gray upper parts and white underparts and its teetering motion, is too well known to need description.

Range: Breeds in northwestern Alaska and in much of northern Canada south to southern California, Arizona, southern Texas, southern Louisiana, and northern South Carolina; winters from California, Louisiana, and South Carolina to southern Brazil and Peru.

Characteristics: The little "Tip-up," as it is appropriately named, from its quaint nodding motion, dwells in every region suited to its needs from Alaska to Florida.

The Spotted Sandpiper is doubtless more widely known than any other of our shore birds, and as it takes wing when disturbed, its "wit, wit" comes to us from beach, river side, and mill pond, from one end of the land to the other. It is the only shore bird that habitually nests in cornfields and pastures, and its handsome buff eggs spotted with chocolate are well known to the farmer's boy everywhere.

The little "Tip-up's" diet includes army worms, squash bugs, cabbage worms, grasshoppers, green flies, and crayfishes. It is among the farmer's friends and should be exempt from persecution.

GREAT HORNED OWL

CEDAR WAXWING

COOT

SPOTTED SANDPIPER

YELLOWHEAD (Xanthocephalus xanthocephalus)

Length, about 10 inches. Our only Blackbird with a yellow head.

Range: Confined to western North America. Breeds from southern British Columbia, southern Mackenzie, southwestern Keewatin, and northern Minnesota to southern California and Arizona, east to southern Wisconsin, Illinois, and Indiana; winters from southwestern California, southern Arizona, southeastern Texas, and southwestern Louisiana south into Mexico.

Characteristics: Apparently Nature started out with the intention of making an Oriole, but decided to make a Blackbird instead—and behold the Yellowhead. He is a sociable chap and nests in great companies in the tule swamps of the West.

The Yellowhead's voice is harsh and guttural and his vocal efforts have been well characterized as a maximum of earnest effort with a minimum of harmony. Late in midsummer, when the young are on the wing, old and young betake themselves to the uplands, grain fields, pastures and corrals, associating as often as not with Redwings and Brewer's Blackbirds (see pages 65 and 30). The Yellowhead feeds principally upon insects, grain, and weed seed, and does not attack fruit or garden produce; but it does much good by eating noxious insects and troublesome weeds; where too abundant it is likely to be injurious to grain.

STARLING (Sturnus vulgaris)

Length, about 8½ inches. General color dark purple or green with reflections; feathers above tipped with creamy buff. In flight and general appearance unlike any native species.

Range: Most abundant in the region about New York City, but becoming common in many other places. Up to the summer of 1927 they had extended their range from New York to Nova Scotia, Quebec, Ontario, Wisconsin, Kansas, Texas, and Florida and are occupying new territory each year.

Characteristics: The Old World has sent us two bird pests—the English Sparrow and the Starling. Although, up to the present time, we cannot convict the Starling of having done any great damage, he has proclivities which make him potentially very dangerous. Introduced into New York in 1890, the original sixty have multiplied many fold and spread in all directions till now they occupy territory many hundreds of miles square, and are multiplying and spreading faster than ever. As I write in Washington, where they have now become a common resident, the calls of a flock of 200 or more can be heard from a neighboring park.

The Starling is a hardy, prolific bird and is also aggressive. Like the English Sparrow, it associates in flocks, which is a great advantage in bird disputes. There is little doubt that the effect of its increase and spread over our country will prove disastrous to native species, such as the Bluebirds, Crested Flycatchers, Swallows, Wrens, and Flickers, all valuable economic species, which nest in cavities as does the Starling.

COWBIRD (Molothrus ater and subspecies)

Length, about 8 inches. Male glossy black with metallic bluish and greenish reflections; head, neck, and breast brown; female brownish gray.

Range: Breeds from southern British Columbia, southern Mackenzie, and southeastern Canada south to northern California, Nevada, northern New Mexico, Texas, Louisiana, and North Carolina; winters from southeastern California and the Ohio and Potomac Valleys to the Gulf and to central Mexico.

Characteristics: Chapman calls the Cowbird a villain—but is not the villain in the piece often the most interesting character on the stage? Thus our Cowbird, short as he is of manners and morals, cannot fail to interest the bird lover. He is full of idiosyncrasies that keep one guessing. Why, for instance, his close association with the peaceful cow? Why his ludicrous attempts to sing, he who has not a thread of music in his whole make-up? How did Madame Cowbird come to lapse from the paths of virtue and, in place of building a nest of her own, foist her eggs and the care of her offspring on smaller and better principled birds to their detriment? (see illustration, page 3).

CHIMNEY SWIFT (Chætura pelagica)

Length, rather less than 5½ inches. Too well known by its flight and habits to need describing.

Range: Breeds in eastern North America from southeastern Saskatchewan, Manitoba, Quebec, and Newfoundland south to Gulf coast; west to Plains from eastern Montana to eastern Texas; winters south of the United States, but in an unknown area.

Characteristics: The popular name of this bird, Chimney Swallow, embodies an error, since the bird not only is not a Swallow, but is not even distantly related to the Swallow family. Unlike the Humming Birds as the Chimney Swift is in appearance and habits, it is structurally not far removed from them. Like the Swallows it is an indefatigable skimmer of the air, and like them it earns a debt of gratitude by destroying vast numbers of our winged enemies, which its unsurpassed powers of flight enable it to capture. Indeed, Chimney Swifts eat nothing but insects.

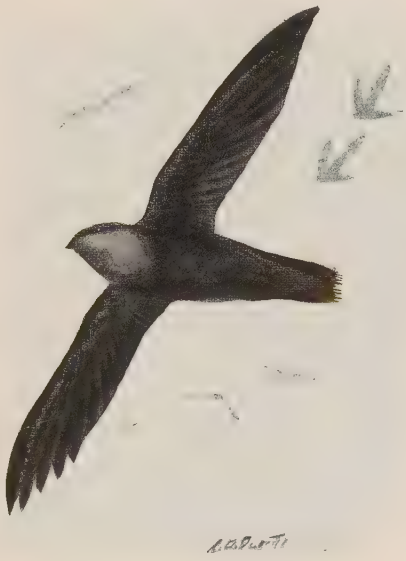
In June Swifts may be seen gathering twigs for nest material. They disdain to pick these up from the ground, but seize the coveted twig with their strong feet and break it off from the terminal branch when in full flight. By means of a sticky saliva secreted for the purpose the Swift glues these twigs to the sides of the chimney in the form of a shallow nest. Although not generally known, Swifts roost in chimneys and cling to the walls by using the sharp-pointed tail as a prop, as do many Woodpeckers in ascending trees.

Any bird lover may win distinction by solving an ornithological riddle and telling us where our Chimney Swifts spend the winter. They come in spring, they go in fall, and at present that is about all we know of the matter, save that they do not hibernate in hollow trees, as many have believed.

YELLOWHEAD :
Male, upper; female, lower

COWBIRD:
Male, upper; female, lower

STARLING



CHIMNEY SWIFT

AMERICAN BLACK-CROWNED NIGHT HERON (Nycticorax nycticorax nævius)

Length, about 24 inches. The black crown distinguishes it from its relative, the Yellow-crowned Night Heron.

Range: Breeds from northern Oregon, southern Wyoming, southern Manitoba, and central Quebec south to Patagonia; winters from northern California and Gulf States southward.

Characteristics: Given for a roosting place a suitable stand of leafy trees, especially ever greens, conveniently near a stream or pond that harbors fish, frogs, and tadpoles, and any locality may have its colony of Night Herons.

As its name implies, this Heron is a bird of the night, not leaving its roost till dusk, when, with frequent iteration of its hoarse squawk, it wings its way in the gathering gloom straight to its feeding place. So rarely is the bird about in daylight that a large colony may exist for years near a town or large city and not above a dozen individuals have an inkling of its existence.

True to its sociable instincts, the Night Heron by preference nests in colonies, and several pairs often place their rude nests of sticks in the same tree; or, in the absence of trees, as in the extensive tule swamps of the Far West, where other conditions are ideal for Herons, they nest on the ground or on the prostrate tules, hundreds of pairs being associated.

This Heron sometimes feeds on field mice, but it eats too many fish to please the fish-culturist, and after it has once learned the way to a hatchery strong measures are needed to discourage its activities.

AMERICAN HERRING GULL (Larus argentatus smithsonianus)

Length, about 24 inches. Deep pearl gray above; much of rest of plumage white. Not readily distinguished in life from its allies.

Range: Breeds in Alaska and in Arctic regions south to southern British Columbia, southern Alberta, northern North Dakota, central Wisconsin, southern Ontario, northern New York, and Maine; winters from southern British Columbia to Lower California and western Mexico, and from the Gulf of St. Lawrence and Great Lakes south to the Bahamas, Yucatan, and coast of Texas.

Characteristics: All things considered, the Herring Gull is probably the best known of the family by reason of its abundance and wide distribution. Moreover, this is the Gull most frequently noticed by passengers as it follows in the wake of our ocean steamers. It breeds no farther south than the coast of Maine, but in winter it is very numerous along the Atlantic coast and in many of our inland ponds.

It does excellent service as a scavenger in our harbors, venturing fearlessly among the shipping to secure anything edible that may find its way overboard. The services of this and other Gulls in such a capacity are so valuable that their destruction under any pretense is to be deprecated. When the craze for feathered hat gear was at its height thousands of Gulls, without regard to species, were killed for millinery purposes; but now that the sale of their feathers is illegal practically everywhere in the United States, the Gulls are rapidly increasing.

GREAT BLUE HERON (Ardea herodias and subspecies)

Length, from 42 to 50 inches.

Range: Breeds from British Columbia and Hudson Bay south to southern Lower California, southern Mexico, and South Atlantic States, winters from Oregon, the Ohio Valley, and Middle States south to the West Indies, Panama, and Venezuela.

Characteristics: When one sees a large bluish bird, with long neck and stiltlike legs, standing motionless by river, pond, or lake, or slowly wading in the shallows, he may be sure he has before him the Great Blue Heron, and a notable bird he is in many ways. Wary as this Heron is and keen to scent danger, he offers so tempting a mark as he wings his way slowly along, with head and neck drawn in against the body and long legs trailing behind, or as he stands motionless watching for game, that he is frequently shot "just for the fun of it." This wanton taking of life is never justifiable, but when the life cut short represents so much beauty and grace as are embodied in this stately bird the crime seems doubly heinous. Naturally this Heron is much less common than he used to be.

Small fish, frogs, tadpoles, and snakes form the bulk of his food, and in some regions he is a determined foe of mice and gophers, and the sight of a Heron in the midst of a dry pasture or in a stubble field watching for a gopher to emerge from his hole is very common.

COMMON TERN (Sterna hirundo)

Length, about 15 inches. The pearl-gray breast and belly distinguish the adult of this Tern from its relatives. The outer web of the outer tail feathers is darker than the inner web; the reverse is true of Forster's Tern, its nearest ally.

Range: Breeds from Great Slave Lake, central Keewatin, and southern Quebec south to southwestern Saskatchewan, northern North Dakota, southern Wisconsin, northern Ohio, and North Carolina; winters from Florida to Brazil.

Characteristics: Our common Tern is, alas, common no longer. The Atlantic coast is peculiarly fitted to be the home of the Tern by reason of the extensive shallows and the great number of sandy islands on which Terns and Gulls used to breed in safety. At the bidding of fashion, however, thousands of these beautiful creatures were slaughtered, till the sand was red with their blood and island colonies that used to number thousands were exterminated.

No excuse serves to palliate the crime of the wholesale murder of these graceful Sea Swallows, as they are aptly termed, which used to make our shores so attractive.

But the tide seems to have turned, partly at least. The Government has set aside islands as breeding resorts and places of refuge and, through the activity of Audubon societies and of individual workers, a certain measure of safety seems now assured to these persecuted birds. It has even proved possible, by the bird sanctuary plan, to increase their numbers again and make them a familiar sight along our shores.

BLACK-CROWNED NIGHT HERON:
Male, upper; young bird, lower

GREAT BLUE HERON

HERRING GULL:
Immature, (upper) and
Adult in summer, (lower)

COMMON TERN

KINGFISHER (Streptoceryle alcyon and subspecies)

Length, about 13 inches. Not to be confused with any other American bird.

Range: Breeds from northwestern Alaska and central Canada south to the southern border of the United States; winters from British Columbia, Nebraska, Illinois, Indiana, Ohio, and Virginia south to the West Indies, Colombia, and Guiana.

Characteristics: The cry of the Kingfisher, which suggests a watchman's rattle in vigorous hands, can be mistaken for the notes of no other bird; nor, for that matter, is the bird himself likely to be confused with any other species. Whether flying, perched on a branch over a stream, or diving for small fish, our Kingfisher is always himself, borrowing none of his peculiarities from his neighbors.

Many of his tropical brothers catch insects for a living; but our bird, early in the history of the development of the Kingfisher family, discovered that fish were easier to catch and in the long run more filling than insects, and hence renounced the family habit and assumed the rôle of fisherman. Instead of using a hollow tree as a nest site, the Kingfisher has apparently learned a lesson from the Sand Swallows and excavates a burrow in some sandbank, usually not far from pond or stream; and you may be sure that any pond chosen by him for a haunt is well stocked with fish.

RED-HEADED WOODPECKER (Melanerpes erythrocephalus)

Length, about 9¾ inches. Our only Woodpecker with red head and broad white wing patch.

Range: From southern Canada to the Gulf coast and from central Montana, central Colorado, and central Texas to the Hudson and Delaware. Generally resident, but more or less migratory in the northern parts of its range.

Characteristics: This strikingly marked and readily identified Woodpecker is common in some localities and entirely wanting in others, which apparently are equally well adapted to the bird's needs. Its habits are a combination of Woodpecker, Jay, and Flycatcher, and catching insects on the wing is a common habit.

Though in general migratory, the bird is apparently indifferent to cold and other weather conditions, and winters wherever food abounds, especially where beechnuts, of which it is very fond, are plentiful. The Red-head eats nearly twice as much vegetable food as it does animal, but the latter includes many destructive insects. For instance, it is greatly to its credit that it eats both species of clover beetles, the corn weevil, cherry scale, and 17-year cicada. On the other hand, vigorous accusations against it are not wanting. It eats corn on the ear, and attacks many kinds of small fruits, including strawberries and apples. It is also guilty of robbing the nests of wild birds of both eggs and nestlings. It damages telegraph poles by boring into them to make nests.

No doubt some of these charges are well founded. For the most part they represent the occasional acts of individuals, or are local and not characteristic of the species as a whole.

RED-SHAFTED FLICKER (Colaptes cafer and subspecies)

Length, 12 to 14 inches. To be distinguished from its Eastern relative (*C. auratus*—see pages 62-63) by its red mustache and nuchal band and the red wing and tail shafts.

Range: Rocky Mountain region from southern Alaska and Saskatchewan south to Oaxaca, Mexico; largely resident.

Characteristics: Few birds are more widely known than the Flicker, as appears from the fact, recorded by Frank M. Chapman, that in the various parts of the country it appears under no fewer than 124 aliases. Though well known, the Flicker is more often heard than seen, its loud call often proclaiming its presence when it is hidden among the trees. As a rule the Flicker is shy, and in some sections it has good reason to be, since it is accounted a game bird and, as such, pursued for the table.

Though a Woodpecker, the Red-shaft departs widely from typical members of the tribe both in structure and habits. Notwithstanding the fact that its bill is not well adapted for boring into wood for larvæ, the bird manages to do considerable damage in the West by making holes, in church steeples, schoolhouses, and other buildings, to serve as roosting quarters. As it is nowise particular as to its domicile, it is possible materially to increase its numbers by putting up nesting boxes for its accommodation.

The bird's subsistence is obtained largely from the ground, where it secures vast quantities of ants, for taking which its tongue is specially adapted; about one-half its food, in fact, consists of these creatures.

CALIFORNIA WOODPECKER (Belanosphyra formicivora and subspecies)

Length, about 9½ inches. Easily distinguished from its fellows by its general black color, white forehead, throat patch, belly and wing patch.

Range: Breeds from northwestern Oregon, California, Arizona, and New Mexico south through Mexico to Panama.

Characteristics: The California Woodpecker is a noisy, frolicsome bird and by all odds the most interesting of our Woodpeckers. Its range seems to be determined by that of the oaks upon which it lives and from which it draws a large part of its subsistence. In California the bird is known to many by the Spanish name, *Carpintero*, or Carpenter, and its shop is the oak, in the dead limbs of which, as in the bark of pines, it bores innumerable holes, each just large enough to receive an acorn. That the birds do not regard the filling of these storehouses as work, but, on the contrary, take great pleasure in it, is evident from their joyous outcries and from the manner in which they chase each other from tree to tree, like boys at tag. In California many of the country schoolhouses are unoccupied in summer and the Woodpeckers do serious damage by drilling holes in the window casings. As long as the acorn crop lasts, so long does the storing work go on.

KINGFISHER

RED-SHAFTED FLICKER

RED-HEADED WOODPECKER

CALIFORNIA WOODPECKER

MOCKING BIRD

BROWN THRASHER

MOCKING BIRD (Mimus polyglottos and subspecies)

Length, 10 inches. Most easily distinguished from the similarly colored Loggerhead Shrike (see page 19) by the absence of a conspicuous black stripe through the eye.

Range: Resident from southern Mexico north to California, Wyoming, Iowa, Ohio, and Maryland; sparingly farther north.

Characteristics: Because of its incomparable medleys and imitative powers, the Mocking Bird is the most renowned singer of the Western Hemisphere. Even in confinement it is a masterly performer, and formerly thousands were trapped and sold for cage birds; but this reprehensible practice has been largely stopped by protective laws. It is not surprising, therefore, that the Mocking Bird should receive protection principally because of its ability as a songster and its preference for the vicinity of dwellings. Its place in the affections of the South is similar to that occupied by the Robin in the North.

It is well that this is true, for the bird appears not to earn protection from a strictly economic standpoint. About half of its diet consists of fruit, and many cultivated varieties are attacked, such as oranges, grapes, figs, strawberries, blackberries, and raspberries. Somewhat less than a fourth of the food is animal matter, and grasshoppers are the largest single element. The bird is fond of cotton worms, and is known to feed also on the chinch bug, rice weevil, and bollworm.

BROWN THRASHER (Toxostoma rufa)

Length, about 11 inches. Brownish red above, heavily streaked with black below.

Range: Breeds from the Gulf States to southern Canada and west to Colorado, Wyoming, and Montana; winters in the southern half of eastern United States.

Characteristics: The Brown Thrasher is more retiring than either the Mocking Bird or Catbird, but like them is a splendid singer. Not infrequently indeed its song is taken for that of its more famed cousin, the Mocking Bird.

It is partial to thickets and gets much of its food from the ground. Its search for this is usually accompanied by much scratching and scattering of leaves; whence its common name. Its call note is a sharp sound like the smacking of lips, useful in identifying this long-tailed, thicket-haunting bird, which does not much relish close scrutiny.

The Brown Thrasher is not so fond of fruit as the Catbird and Mocker, but devours a much larger percentage of animal food. Beetles form one-half of the animal food, grasshoppers and crickets one-fifth, caterpillars, including cutworms, somewhat less than one-fifth, and bugs, spiders, and millepedes comprise most of the remainder. By its destruction of these and other insects, which constitute more than 60 per cent of its food, the Thrasher much more than compensates for that portion (about one-tenth) of its diet derived from cultivated crops.

Photograph by L. W. Brownell

MOTHER IS TAKING NO CHANCES OF LETTING HER LITTLE ONE SPILL ON ITS CLEAN DRESS: A BROWN THRASHER FEEDING ITS YOUNG

SPARROW HAWK

RED-TAILED HAWK

SPARROW HAWK (**Cerchneis sparveria** and subspecies)

Length, about 10 inches. This is one of the best known and handsomest, as well as the smallest, of North American Hawks.

Range: Breeds throughout most of North America and in much of South America; winters in the southern United States and southward.

Characteristics: The Sparrow Hawk, which is a true Falcon, lives in the more open country and builds its nest in hollow trees. It is abundant in many parts of the West, where telegraph poles afford it convenient perching and feeding places. Its food consists of insects, small mammals, birds, spiders, and reptiles. Grasshoppers, crickets, and terrestrial beetles and caterpillars make up considerably more than half its subsistence, while field mice, house mice, and shrews cover fully 25 per cent of its annual supply. The balance of the food includes birds, reptiles, and spiders.

Contrary to the usual habits of the species, some individuals during the breeding season capture nestling birds for food for their young and create considerable havoc among the songsters of the neighborhood. In agricultural districts when new ground is broken by the plow, they sometimes become very tame, even alighting for an instant under the horses in their endeavor to seize a worm or insect. Out of 410 stomachs examined, 314 were found to contain insects; 129, small mammals, and 70, small birds. This little Falcon renders good service in destroying noxious insects and rodents and should be encouraged and protected.

RED-TAILED HAWK (**Buteo borealis** and subspecies)

Length, about 2 feet. One of our largest Hawks; adults with tail reddish brown.

Range: Breeds in the United States, Mexico, Costa Rica, Canada, and Alaska; winters generally in the United States and south to Costa Rica.

Characteristics: The Red-tailed Hawk, or "Hen Hawk," as it is commonly called, is one of the best known of all our birds of prey, and is a widely distributed species of great economic importance. Its habit of sitting on some prominent limb or pole in the open, or flying with measured wing beat over prairies and sparsely wooded areas on the lookout for its favorite prey, causes it to be noticed by the most indifferent observer.

Although not as omnivorous as the Red-shouldered Hawk, it feeds on a variety of foods, such as small mammals, snakes, frogs, insects, birds, crawfish, centipedes, and even carrion. In regions where rattlesnakes abound it destroys considerable numbers of the reptiles.

Although it feeds to a certain extent on poultry and birds, it is nevertheless entitled to general protection on account of the insistent warfare it wages against field mice and other small rodents and insects that are so destructive to young orchards, nursery stock, and farm produce. Out of 530 stomachs examined, 457, or 85 per cent, contained the remains of mammal pests, such as field mice, pine mice, rabbits, several species of ground squirrels, pocket gophers, and cotton rats, and only 62 contained the remains of poultry or game birds.

Photograph by Howard H. Cleaves

A RED-SHOULDERED HAWK DEMONSTRATES THE REACH OF ITS LEGS

For experimental purposes a stuffed Owl was tied in an upright position and the investigators secreted themselves to await developments. Almost immediately there was an uproar in which every bird in the vicinity took part. A Red-shouldered Hawk swooped down upon the bait and gave it a vicious jab, while the others were an interested audience perched in adjoining trees around the arena. The attack was repeated until the Owl's feathers were almost all pulled out and excelsior stuffing showed in several places.

COOPER'S HAWK

MOURNING DOVE

COOPER'S HAWK (Accipiter cooperi)

Length, about 15 inches. Medium sized, with long tail and short wings, and without the Marsh Hawk's white patch on rump.

Range: Breeds throughout most of the United States and southern Canada; winters from British Columbia and the middle United States to Costa Rica.

Characteristics: The Cooper's Hawk, or "Blue Darter," as it is familiarly known throughout the South, is preëminently a poultry- and bird-eating species, and its destructiveness in this direction is surpassed only by that of its larger congener, the Goshawk, which occasionally in autumn and winter enters the United States from the north in great numbers. The almost universal prejudice against birds of prey is largely due to the activities of these two birds, assisted by a third, the Sharp-shinned Hawk, which in habits and appearance might well pass for a small Cooper's Hawk.

These birds usually approach under cover and drop upon unsuspecting victims, making great inroads upon poultry yards and game coverts. Out of 123 stomachs examined, 38 contained the remains of poultry and game birds, 66 the remains of other birds, and 12 the remains of mammals. Twenty-eight species of wild birds were identified in the above-mentioned material. This destructive Hawk, together with its two near relatives, should be destroyed by every possible means.

MOURNING DOVE (Zenaidura macroura and subspecies)

Length, 12 inches. The dark spot on the side of the neck distinguishes this bird from all other native Doves and Pigeons except the White-winged Dove. The latter has the upper third of wing white.

Range: Breeds throughout the United States and in Mexico, Guatemala, and southern Canada; winters from central United States to Panama.

Characteristics: The food of the Mourning Dove is practically all vegetable matter (over 99 per cent), principally seeds of plants, including grain. Wheat, oats, rye, corn, barley, and buckwheat were found in 150 out of 237 stomachs, and constituted 32 per cent of the food. Three-fourths of this was waste grain picked up after harvest. The principal and almost constant diet is weed seeds, which are eaten throughout the year and constitute 64 per cent of the entire food. In one stomach were found 7,500 seeds of yellow woodsorrel, in another 6,400 seeds of barn grass or foxtail, and in a third 2,600 seeds of slender paspalum, 4,820 of orange hawkweed, 950 of hoary vervain, 120 of Carolina cranesbill, 50 of yellow woodsorrel, 620 of panic grass, and 40 of various other weeds. None of these are useful, and most of them are troublesome weeds. The Dove does not eat insects or other animal food. It should be protected in every possible way.

Photograph by William L. and Irene Finley

A MEXICAN GROUND DOVE DEFENDING HER HOME

While a Dove is a shy and gentle bird, here is a case where the mother raised her wings and slapped the intruding finger whenever it came near her home.

BOBOLINK

COMMON CROW

BOBOLINK (Dolichonyx oryzivorus)

Length, about 7 inches.

Range: Breeds from Ohio northeast to Nova Scotia, north to Manitoba, and northwest to British Columbia; winters in South America.

Characteristics: When American writers awoke to the beauty and attractiveness of our native birds, among the first to be enshrined in song and story was the Bobolink. Few species show such striking contrasts in the color of the sexes, and few have songs more whimsical. In its northern home the bird is loved for its beauty and its rich melody; in the South it earns deserved hatred by its destructiveness.

Bobolinks reach the southeastern coast of the United States the last half of April, just as rice is sprouting, and at once begin to pull up and devour the sprouting kernels. Soon they move on to their northward breeding grounds, where they feed upon insects, weed seeds, and a little grain.

When the young are well on the wing, they gather in flocks with the parent birds and gradually move southward, being then generally known as Reedbirds. They reach the rice fields of the Carolinas about August 20, when the rice is in the milk. Then until the birds depart for South America planters and birds fight for the crop, and in spite of constant watchfulness and innumerable devices for scaring the birds a loss of 10 per cent of the rice is the usual result.

COMMON CROW (Corvus brachyrhynchos and subspecies)

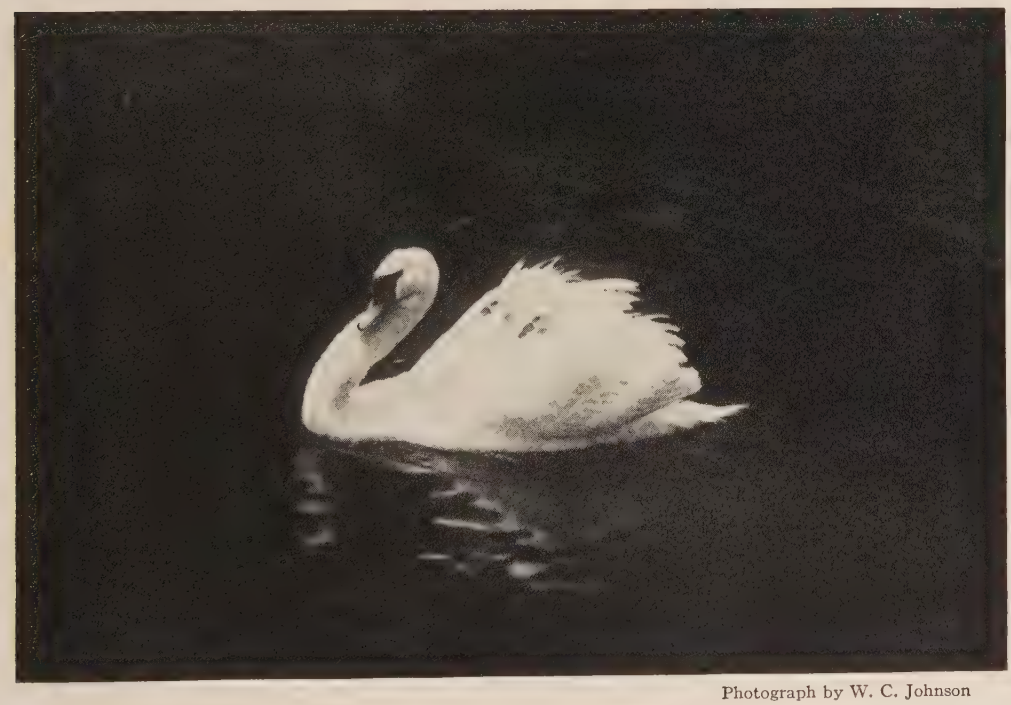
Length, 19 inches.

Range: Breeds throughout the United States, in Southern Alaska, most of Canada and to central Mexico; winters generally in the United States and to Central Mexico.

Characteristics: The general habits of the Crow are universally known. Its ability to commit such misdeeds as pulling corn and stealing eggs and fruit and to get away unscathed is little short of marvelous. Much of the Crow's success in life is due to coöperation, and the social instinct of the species has its highest expression in the winter roosts, which are sometimes frequented by hundreds of thousands of Crows. From these roosts daily flights of many miles are made in search of food.

Injury to sprouting corn is the most frequent complaint against this species, but by coating the seed grain with coal tar most of this damage may be prevented. Losses of poultry and eggs may be averted by proper housing and the judicious use of wire netting.

The insect food of the Crow includes wireworms, cutworms, white grubs, and grasshoppers, and during outbreaks of these insects the Crow renders good service. The bird is also an efficient scavenger. But chiefly because of its destruction of beneficial wild birds and their eggs the Crow must be classed as a criminal, and a reduction in its numbers in some localities is justifiable (see also page 7).



Photograph by W. C. Johnson

ALL ABOARD!

The first venture of these little Swans upon the stormy seas of life is safely negotiated upon their mother's back, while she, with a true mother's pride in her offspring, takes every care that no harm shall come.

FLICKER

YELLOW-BELLIED SAPSUCKER

FLICKER (Colaptes auratus and subspecies)

Length, 13 inches. The yellow under surface of the wing, yellow tail shafts, and white rump are characteristic.

Range: Breeds in the eastern United States west to the Plains and in the forested parts of eastern Canada and northern Alaska; winters in most of the eastern United States.

Characteristics: The Flicker inhabits the open country rather than the forest and delights in parklike regions where trees are numerous and scattered. It nests in any large cavity in a tree and readily appropriates an artificial box. It is possible, therefore, to insure the presence of this useful bird about the farm and to increase its numbers.

This is the most terrestrial of our Woodpeckers and procures much of its food from the ground. The largest item of animal food is ants, of which the Flicker eats more than any other common bird. Ants were found in 524 of the 684 stomachs examined and 98 stomachs contained no other food. One stomach contained over 5,000 and two others held over 3,000 each. While bugs are not largely eaten by the Flicker, one stomach contained 17 chinch bugs. Wild fruits are next to ants in importance in the Flicker's dietary. Of these, sour gum and wild black cherry stand at the head. The food habits of this bird are such as to recommend it to complete protection.

YELLOW-BELLIED SAPSUCKER (Sphyrapicus varius and subspecies)

Length, about 8½ inches. The only Woodpecker having top of head from base of bill red, combined with a black patch on breast.

Range: Breeds in northern half of the United States and in Canada; winters in most of the States and south to Costa Rica.

Characteristics: The Yellow-bellied Sapsucker is rather silent and suspicious and generally manages to have a tree between himself and the observer. Hence the bird is much better known by its works than its appearance (see illustration below). The regular girdles of holes made by this bird are common on a great variety of trees; in all about 250 kinds are known to be attacked. Occasionally young trees are killed outright, but more loss is caused by stains and other blemishes in the wood which result from Sapsucker punctures. These blemishes, which are known as bird pecks, are especially numerous in hickory, oak, cypress, and yellow poplar.

The two principal components of the Sapsucker's vegetable food are wild fruits of no importance and cambium (the layer just beneath the bark of trees). In securing the cambium the bird does the damage above described. The Yellow-bellied Sapsucker, unlike other Woodpeckers, thus does comparatively little good and much harm.

Photograph by George Shiras, 3rd

SAP BASINS MADE IN BARK BY A SAPSUCKER

The regularity of the hole shows that this bird is methodical. The basins were made in six weeks, probably by one bird, and served not only to collect sap, but also to catch flies attracted by the sweet fluid.

MEADOWLARK

RED-WINGED BLACKBIRD

MEADOWLARKS (Sturnella magna and subspecies and **Sturnella neglecta)**

Length, about 10¾ inches.

Range: Breed generally in the United States, southern Canada, and Mexico to Panama; winters from the Ohio and Potomac Valleys and British Columbia southward.

Characteristics: Our two Meadowlarks, though differing much in song, resemble each other closely in plumage and habits. Grassy plains and uplands covered with a thick growth of grass or weeds, with near-by water, furnish the conditions best suited to the Meadowlark's taste. The song of the Western bird is loud, clear, and melodious. That of its Eastern relative is feebler and loses much by comparison. In many localities the Meadowlark is classed and shot as a game bird. From the farmer's standpoint this is a mistake, since its value as an insect eater is far greater than as an object of pursuit by the sportsman.

Both the boll weevil, the foe of the cotton grower, and the alfalfa weevil, are among the beetles it habitually eats. Twenty-five per cent of the diet of this bird is beetles, half of which are predacious ground beetles and are accounted useful insects, and one-fifth are destructive weevils.

Caterpillars form 11 per cent of the food and are eaten every month in the year. Among these are many cutworms and the well-known army worm. Grasshoppers are favorite food and are eaten in every month and almost every day. The vegetable food (24 per cent of the whole) consists of grain and weed seeds.

RED-WINGED BLACKBIRD (Agelaius phœniceus and subspecies)

Length, about 9½ inches.

Range: Breeds in North America south of the Barren Grounds to Central America; winters in the southern half of United States and south to Costa Rica.

Characteristics: The prairies of the upper Mississippi Valley, with their numerous sloughs and ponds, furnish ideal nesting places for Redwings, and consequently this region has become the great breeding ground for the species. These prairies pour forth the vast flocks that play havoc with grain fields. East of the Appalachian Range, swamps, and marshes on the shores of lakes, rivers, and estuaries are the only available breeding sites and, as these are comparatively few and small, the species is much less abundant than in the West.

Redwings are eminently gregarious, living in flocks and breeding in communities.

The food of the Redwing consists of 27 per cent animal matter and 73 per cent vegetable. Insects constitute practically one-fourth of the food. Beetles (largely weevils, a most harmful group) amount to 10 per cent. Grasshoppers are eaten in every month and amount to about 5 per cent. Caterpillars (among them the injurious army worm) are eaten at all seasons and aggregate 6 per cent. Ants, wasps, bugs, flies, dragon flies, and spiders also are eaten. The vegetable food consists of seeds, including grain, of which oats are the favorite, and some small fruits. When in large flocks this bird is capable of doing great harm to grain.

Photograph by William L. Finley and H. T. Bohlman

THE DINNER CALL IN THE RED-WINGED BLACKBIRD HOME

His black body and scarlet shoulder patches cause the Redwing to be easily recognized about ponds and marshes of all parts of our country. He likes to tie his home in the reeds a foot or so above the water.

DOWNY WOODPECKER

YELLOW-BILLED CUCKOO

DOWNY WOODPECKER (Dryobates pubescens and subspecies)

Length, 6 inches. Our smallest Woodpecker; spotted with black and white. Dark bars on the outer tail feathers distinguish it from the similarly colored but larger Hairy Woodpecker.

Range: Resident in forested parts of the United States, Canada, and Alaska.

Characteristics: This Woodpecker is widely distributed, living in woodland tracts, orchards, and gardens. The bird has several characteristic notes, and, like the Hairy Woodpecker, is fond of beating on a dry resonant tree branch a tattoo which to appreciative ears has the quality of woodland music. In a hole excavated in a dead branch the Downy Woodpecker lays four to six eggs. This and the Hairy Woodpecker are among our most valuable allies, their food consisting of some of the worst foes of orchard and woodland, which the Woodpeckers are especially equipped to dig out of dead and living wood.

In the examination of 723 stomachs of this bird, animal food, mostly insects, was found to constitute 76 per cent of the diet and vegetable matter 24 per cent. The animal food consists largely of beetles that bore into timber or burrow under the bark. Caterpillars amount to 16 per cent of the food and include many especially harmful species.

YELLOW-BILLED CUCKOO (Coccyzus americanus and subspecies)

Length, about 12 inches. The yellow lower part of the bill distinguishes this bird from its near relative, the Black-billed Cuckoo.

Range: Breeds generally in the United States, northern Mexico, and southern Canada; winters in South America.

Characteristics: This bird lives on the edges of woodland, in groves, orchards, parks, and even in shaded village streets. It is sometimes known as Rain Crow, because its very characteristic notes are supposed to foretell rain. The Cuckoo has sly, furtive ways as it moves among the bushes or flits from tree to tree, and is much more often heard than seen.

Unlike its European relative, it does not lay its eggs in other birds' nests, but builds a nest of its own. This is, however, a rather crude and shabby affair—hardly more than a platform of twigs sufficient to hold the greenish eggs.

The Cuckoo is extremely useful because of its insectivorous habits, especially as it shows a marked preference for the hairy caterpillars, which few birds eat. One stomach that was examined contained 250 American tent caterpillars; another, 217 fall webworms. In places where tent caterpillars are abundant they seem to constitute a large portion of the food of this and the Black-billed Cuckoo.

Photograph by John Woodcock

A RUFFED GROUSE ABOUT TO DRUM

Of all the characteristics of this superb game bird, its habit of drumming is perhaps the most remarkable. This loud tattoo begins with the measured thump of the big drum, then gradually changes and dies away in the rumble of the kettledrum. It may be briefly represented thus: *Thump—thump—thump—thump, thump; thump, thump-rup rup rup rup r-r-r-r-r-r-r-r-r.* The sound is produced by the male bird beating the air with his wings as he stands firmly braced on some favorite low perch; and it is now quite well known to be his call to the female—an announcement that he is at the old rendezvous.

OSPREY

BALD EAGLE:
Male, upper; immature, lower

AMERICAN OSPREY (Pandion haliaëtus carolinensis)

Length, about 23 inches. The great size, brown upper parts and white underparts are distinguishing features.

Range: Breeds from northwestern Alaska, and central Canada south to the Gulf coast, western Mexico and Lower California; winters from the southern United States, Lower California and Mexico to Central America; occurs also in South America.

Characteristics: A thin, high-pitched whistle, the alarm as well as the call note of the Osprey, frequently directs the attention of the passer-by to this fine Hawk as he circles high in the air on the watch for fish.

The bird is common along our coast and to some extent along our rivers, and his bulky nest of twigs, often in low trees or sometimes on the ground, frequently attests his former presence when he is wintering elsewhere.

When unmolested, Ospreys return to their own strip of territory year after year, and they and their descendants probably rear their young in the same nest for generations, repairing it from season to season as necessity requires. The Osprey lives solely on fish which he catches himself—he disdains carrion—diving from mid-air upon his quarry and often burying himself in the water momentarily by the force of his descent. Usually he succeeds in carrying his prey to his nest, though his slow and labored wing-beats often prove how heavy is his load. Visitors to the seashore, and even old residents, never tire of watching his superb flight and interesting habits, and his plunge after his quarry, whether successful or unsuccessful, is a sight to be remembered (see illustration, page 7).

BALD EAGLE (Haliæetus leucocephalus and subspecies)

Length, about 33 inches. The white head (adult) and naked tarsus distinguish this species from the Golden Eagle.

Range: A resident of Alaska, much of Canada, the whole of the United States in suitable localities, and northern Mexico.

Characteristics: Though a fisherman by profession, the "White Head" is by no means the master of his craft that the Osprey is. In fact, he never fishes for himself so long as he can rob the more skillful and more industrious Fish Hawk. When necessity compels, however, he fishes to some purpose, and much after the manner of his erstwhile victim, the Fish Hawk. He is far less fastidious in his food habits than that bird, however, and often gorges himself on dead fish gathered alongshore, especially on the great salmon rivers of the Northwest, until he cannot fly.

When fish are scarce and waterfowl are plentiful, the White Head has little difficulty in living off them.

Complaint is made in Alaska, where the Bald Eagle is numerous, that he sometimes interferes with blue-fox farming by killing the animals for food. Though the blue fox is not a large animal he is by no means a pigmy, and the bird who would make him his quarry must needs possess both strength and determination. As this Eagle has been taken for our national emblem, it would seem to be the part of patriotism to condone his faults and remember only his virtues, among which are a magnificent presence, superb powers of flight, and devoted care of his family.

Photograph from Francis H. Herrick

A STERN-VISAGED MONARCH OF THE AIR—THE AMERICAN, OR BALD EAGLE

MARSH HAWK

TURKEY BUZZARD

MARSH HAWK (Circus hudsonius)

Length, about 19 inches. The ashy upper parts, white rump, and long tail of the adult male sufficiently distinguish this Hawk; while the fuscous upper parts and buff underparts much streaked with brown distinguish the female and young.

Range: Breeds from northeastern Siberia, Alaska and northern Canada to the southern United States; winters from British Columbia and the Ohio Valley to Colombia.

Characteristics: Though not exclusively a marsh frequenter, as its name might seem to imply, this Hawk prefers open country, and its favorite hunting grounds are meadow and marsh, in which it nests on the ground. It flies rather low, the better to see and drop suddenly upon the luckless meadow mice—its favorite food. Unfortunately, small birds form part of its fare, and there are localities, like Cape Cod and Marthas Vineyard, in Massachusetts, where this Hawk has earned a bad reputation as a destroyer of poultry and game.

However, over much the larger part of the vast territory it inhabits the Marsh Hawk is a rodent eater, and the debt of gratitude it lays upon the farmer is large. This debt should be fully discharged by preserving the bird and encouraging its presence, unless it is caught committing overt acts. In other words, as this bird is very beneficial over most of its range, individual Hawks should be presumed to be innocent unless they are actually detected in transgression.

Photograph by William L. Finley and H. T. Bohlman

A DOWNY YOUNG TURKEY VULTURE

He has the reputation of being a lost soul in the bird world. He is a bird of prey, but, with a foot like a Chicken, he cannot clutch and hunt like a Hawk or Eagle. He does not hunt living things; he plays a waiting game.

TURKEY BUZZARD (Cathartes aura and subspecies)

Length, about 30 inches. The naked head and neck and glossy black plumage are distinctive.

Range: Extends from southwestern Canada, northern Minnesota, southern New York, and south to southern South America.

Characteristics: This Buzzard displays superb powers of flight which even the Eagle cannot surpass, and no small part of its time is spent in the upper air, describing great circles on motionless wings as if for the mere pleasure of flight. Let another Buzzard, however, discover a carcass, and the movements of our aëronaut as he hastens to the feast are at once noted by his next neighbor, and his by a third, till the carrion feeders of a wide territory are assembled. Sight and not smell, is depended on by the Buzzard to guide him to his food.

Though of great strength and provided with a formidable bill, the Buzzard rarely, if ever, attacks living animals, unless they are disabled, but depends upon death to provide for his wants. No doubt his ability to fast is as great as his capacity for gorging himself when occasion offers, and he must often go for days without food.

As a scavenger the Buzzard does good service and should continue to enjoy the protection which is at present accorded it in nearly every State of the Union.

SCREECH OWLS

BARN OWL

SCREECH OWL (Otus asio and subspecies)

Length, about 8 inches. Our smallest Owl with ear tufts. There are two distinct phases of plumage—one grayish and the other bright rufous.

Range: Resident throughout the United States, southern Alaska, southern Canada, and northern Mexico.

Characteristics: The little Screech Owl inhabits orchards, groves, and thickets, and hunts for its prey in such places as well as along hedgerows and in the open. During warm spells in winter it forages quite extensively and stores up in some hollow tree considerable quantities of food for use during inclement weather. Such larders frequently contain enough mice or other prey to bridge over a period of a week or more.

With the exception of the Burrowing Owl, this is probably the most insectivorous of the nocturnal birds of prey. It feeds also upon small mammals, birds, reptiles, batrachians, fish, spiders, crawfish, scorpions, and earthworms. Grasshoppers, crickets, ground-dwelling beetles, and caterpillars are its favorites among insects, as are field mice among mammals and Sparrows among birds. Out of 324 stomachs examined, 169 were found to contain insects; 142, small mammals; 56, birds, and 15, crawfish.

In recent years a close study of the habits of Screech Owls has proved them to be too destructive to small birds to serve as good neighbors.

AMERICAN BARN OWL (Tyto alba pratincola)

Length, about 17 inches. Facial disk not circular as in our other Owls; plumage above, pale yellow; beneath, varying from silky white to pale bright tawny.

Range: Resident from Ontario, New York, Ohio, Nebraska, and California south to Panama.

Characteristics: The Barn Owl, often called Monkey-faced Owl, is one of the most beneficial of the birds of prey, since it feeds almost exclusively on small mammals that injure farm produce, nursery, and orchard stock. It hunts principally in the open and consequently obtains such mammals as pocket gophers, field mice, common rats, house mice, harvest mice, kangaroo rats, and cotton rats. It occasionally captures a few birds and insects.

At least a half bushel of the remains of pocket gophers have been found in the nesting cavity of a pair of these birds. Remembering that a gopher has been known in a short time to girdle seven apricot trees worth $100, it is hard to overestimate the value of the service of a pair of Barn Owls; 1,247 pellets of the Barn Owl collected from the Smithsonian towers contained 3,100 skulls, of which 3,004, or 97 per cent, were of mammals; 92, or 3 per cent, of birds, and 4 were of frogs. The bulk consisted of 1,987 field mice, 656 house mice, and 210 common rats. This valuable Owl should be rigidly protected everywhere.

Photograph by George Shiras, 3rd

A REMARKABLE FLASHLIGHT OF A BARRED OWL, ON THE BANKS OF WHITE FISH RIVER, MICHIGAN

The photographer was looking for deer when this picture was made. The flash was held in one hand and the camera in the other. When the powder was ignited, the Owl fell 15 feet into the water, swore like a trooper, and waded ashore.

KILLDEER

UPLAND PLOVER

BLACK TERN

FRANKLIN'S GULL

KILLDEER (Oxyechus vociferus)

Length, 10 inches. Distinguished by its piercing and oft-repeated cry—*killdee.*

Range: Breeds throughout the United States, southern Canada, and northern Mexico; winters from central United States to South America.

Characteristics: The Killdeer is one of the best known of the shore bird family. It often visits the farmyard and commonly nests in pastures or cornfields. It is rather suspicious, however, and on being approached takes flight with loud cries. It is noisy and restless, but fortunately most of its activities result in benefit to man. The food is of the same general nature as that of the Upland Plover, but is more varied.

The Killdeer feeds upon beetles, grasshoppers, caterpillars, ants, bugs, caddis flies, dragon flies, centipedes, spiders, ticks, oyster worms, earthworms, snails, crabs, and other Crustacea. Among the beetles consumed are such pests as the alfalfa weevil, cotton boll weevil, clover-root weevil, clover-leaf weevil, pine weevil, bill-bugs, white grubs, wireworms, and leaf beetles. The bird also devours cotton worms, cotton cutworms, horseflies, mosquitoes, cattle ticks, and crawfish. One stomach contained hundreds of larvæ of the salt-marsh mosquito, one of the most troublesome species.

The Killdeer preys extensively upon insects that are annoying to man and injurious to his stock and crops, and this should be enough to remove it from the list of game birds and insure its protection.

AMERICAN BLACK TERN (Chlidonias nigra surinamensis)

Length, 10 inches. In autumn occurs as a migrant on the east coast of the United States, and then is in white and gray plumage. During the breeding season it is confined to the interior, is chiefly black, and is the only dark Tern occurring inland.

Range: Breeds from California, Colorado, Missouri, and Ohio, north to central Canada; winters from Mexico to South America; migrant in eastern United States.

Characteristics: This Tern, unlike most of its relatives, passes much of its life on freshwater lakes and marshes of the interior. Its nests are placed among the tules and weeds, on floating vegetation, or on muskrat houses. It lays from 2 to 4 eggs.

Its food is more varied than that of any other Tern. So far as known, it preys upon no food fishes, but feeds extensively upon such enemies of fish as dragonfly nymphs, fish-eating beetles, and crawfishes. Unlike most of its family, it devours a great variety of insects, many of which it catches as it flies.

Dragon flies, May flies, grasshoppers, predacious diving beetles, scarabæid beetles, leaf beetles, gnats, and other flies are the principal kinds preyed upon. Fishes of small economic value were found to compose only a little more than 19 per cent of the contents of 145 stomachs.

The great consumption of insects by the Black Tern places it among the beneficial species worthy of protection.

UPLAND PLOVER (Bartramia longicauda)

Length, 12 inches. The only plainly colored shore bird which occurs east of the Plains and inhabits exclusivey dry fields and hillsides.

Range: Breeds from northern Alaska and Canada south to southern Oregon, Utah, Oklahoma, and Virginia; winters in Argentina.

Characteristics: This, the most terrestrial of our waders, is shy and wary, but it has the one weakness of not fearing men on horseback or in a vehicle. One of these methods of approach, therefore, is nearly always used by the sportsman, and, since the bird is highly prized as a table delicacy, it has been hunted to the verge of extermination.

As the Upland Plover is strictly beneficial, it should no longer be classed as a game bird and allowed to be shot. Ninety-seven per cent of the food of this species consists of animal forms, chiefly of injurious and neutral species. The vegetable food is mainly weed seeds. Almost half of the total subsistence is made up of grasshoppers, crickets, and weevils. Among the weevils eaten are the cotton boll weevil, greater and lesser clover-leaf weevils, cowpea weevils, and bill-bugs. This bird devours also leaf beetles, wireworms, white grubs, army worms, cotton worms, cotton cutworms, sawfly larvæ, horseflies, and cattle ticks. In brief, it injures no crop, but consumes a host of the worst enemies of agriculture.

FRANKLIN'S GULL (Chroicocephalus pepixcan)

Length, 15 inches. During its residence in the United States Franklin's Gull is practically confined to the interior and is the only inland Gull with black head and red bill.

Range: Breeds in the Dakotas, Iowa, Minnesota, and the neighboring parts of southern Canada; winters from the Gulf coast to Peru and Chile.

Characteristics: Nearly all of our Gulls are coast-loving species and spend comparatively little of their time in fresh water, but Franklin's is a true inland Gull. Extensive marshes bordering shallow lakes are its chosen breeding grounds, and as many such areas are being reclaimed for agricultural purposes it behooves the tillers of the soil to protect this valuable species.

When undisturbed this Gull becomes quite fearless and follows the plowman to gather the grubs and worms from the newly turned furrows. It lives almost exclusively upon insects, of which it consumes great quantities. Its hearty appetite is manifest from the contents of a few stomachs: A, 327 nymphs of dragon flies; B, 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps, and 1 spider; C, 82 beetles, 87 bugs, 984 ants, and 1 cricket, 1 grasshopper, and 2 spiders. About four-fifths of the total food is grasshoppers, a strong point in favor of this bird. Other injurious creatures eaten are bill-bugs, squash bugs, leaf hoppers, click beetles (adults of wireworms), May beetles (adults of white grubs), and weevils.

Franklin's Gull is probably the most beneficial bird of its group.

Photograph by William L. and Irene Finley

A ROAD RUNNER, OR COCK OF THE DESERT

A typical bird of the cactus country of the American Southwest bringing in a whip-tailed lizard to her young in a cholla cactus. Her larder contained four kinds of lizards.

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YOUNG GOLDEN EAGLES READY TO BREAK HOME TIES

There are two species of Eagles in the United States—the Golden Eagle, nearly exterminated east of the Mississippi and the Bald Eagle, our national bird (see Color Plate, page 68, and text, page 69). Alaska is trying hard to reduce the number of the latter. Her bounty law has caused the slaughter of more than 25,000 Eagles. The salmon canners claim that the Bald Eagles catch many fish and are destructive to fur-bearing and young game animals.

Photograph by William L. Finley and H. T. Bohlman

A FAMILY OF HALF-GROWN BURROWING OWLS

These Owls are often associated with prairie dogs and ground squirrels. The nest is always in a burrow several feet under ground, frequently in the deserted home of one of these or some other burrowing animal. It was formerly reported that birds and rodents lived together in the same burrow, but this is not true.

FRIENDS OF OUR FORESTS—THE WARBLERS

Industrious Woodland Songsters Constitute an Innumerable Army Defending Our Trees Against Destructive Insect Hordes

By Henry W. Henshaw

With Illustrations in Color from Paintings by Louis Agassiz Fuertes

AT EVERY stage of their growth, from the seed to the adult tree, our forest, shade, and orchard trees are subject to the attack of hordes of insect enemies, which, if unchecked, would soon utterly destroy them.

What the loss of our forest and shade trees would mean to us can better be imagined than described. Wood enters into so many products that it is difficult to think of civilized man without it, while the fruits of our orchards also are of the greatest importance.

Aside from the economic loss, which can hardly be imagined, much less estimated, how barren the world would seem shorn of our forests and beautiful shade trees!

Fortunately, the insect foes of trees are not without their own persistent enemies, and among them are many species of birds whose equipment and habits specially fit them to deal with insects and whose entire lives are spent in pursuit of them.

Many insects at one or another stage of their existence burrow deeply into the bark or even into the living wood of trees, and so are quite safe from ordinary bird enemies. Woodpeckers, however, being among the most highly specialized of birds, are wonderfully equipped to dig into wood and to expose and destroy these hidden foes (see pages 52-53 and 66-67).

THE WARBLERS ARE A DEFENDING ARMY

Certain insects that largely confine their attacks to the smaller branches and terminal twigs are sought out and preyed upon by Nuthatches, Creepers, Titmice, and Warblers. Others, and their number is legion, attack the blossoms and foliage, and here the nimble and sharp-eyed Warblers render supreme service, the number of plant lice and lepidopterous larvæ they destroy in a single day almost challenging belief.

Thus our woodland songsters are among the most important of all our birds, and in their own field render man unequaled service. Moreover, very few have any injurious habits, and the little harm they do, if any, weighs as nothing in the balance when compared with the good. By reason of their numbers and their activity in hunting insects, our Warblers take first place as preservers of the forest, and the following account, which treats of about half the total number, is devoted to the more conspicuous, the more important, and the commoner species.

NEW WORLD WARBLERS DIFFER FROM THE OLD

Our Wood Warblers are assembled in a rather loosely defined family (the Mniotiltidæ), embracing in all about 140 species, of which more than a third are visitors to the United States. They are fairly well distributed over the country at large, although more species make their summer homes in the eastern half of the United States than in the western.

A number of notable species, however, summer in the West, as they do also in the Southern States.

Our New World Warblers are quite unlike their Old World relatives, the Sylviidæ, or true Warblers, whose family is comprised of some 75 genera and between 500 and 600 species.

Not only do our American species differ structurally in many particulars from their Old World representatives, especially in possessing nine instead of ten primaries, but they differ markedly also in appearance and habits. It may be said

in passing that while our Warblers are brilliantly colored and many of them sexually dissimilar, those of the Old World are not only small, but plainly plumaged; moreover, the sexes are generally alike in coloration.

The larger number of our Warblers, as well as the most characteristic, are included in the one genus Dendroica, which is notable, since it includes more species than any other genus of North American birds.

Fortunately for the bird lover, our Wood Warblers are not recluses. They are creatures of light and sunshine. Some of them, it is true, retire to the mountain fastnesses or the depths of coniferous forests during the nesting period; but the number of these is small and their withdrawal is for a comparatively short period only, while the majority at all times of the year favor the edges of the forest, open woods, or brush clearings.

Their preference for such situations brings many within the bounds of civilization and renders it comparatively easy for any one so inclined to make their acquaintance. During migration they assemble in flocks, so they are, on the whole, pretty well known; and since, as a rule, they are not shy, they have long been favorite objects of observation and study.

WARBLERS AS SONGSTERS

Despite their name, which would seem to imply musical ability of no mean order, our Wood Warblers, with few exceptions, occupy no very high place in the musical galaxy. All sing, however, after a fashion, and the musical efforts of some are pleasing, even according to human standards. While most Warblers are prodigal enough with their music and sing early and often, especially prior to and during the nesting season, their music is frequently so faint as to be audible only to the trained ear of the bird lover.

As if aware of their musical inferiority, few display much enthusiasm in their vocal efforts, but sing while they work, or while pausing for a brief moment as they move among the foliage hunting for food. With them, singing appears to be an audible expression of general content and well being, and, no doubt, an effort to please and attract their mates.

Certain members of the Thrush and Thrasher families, on the contrary, which contain the ranking songsters of bird life, as if conscious of their supremacy, are wont to mount a commanding perch when about to sing, and to pour out their melody for all the world to hear. With them, singing is not merely incidental to the day's work. It is a conscious and supreme effort, and is much too important to be slighted or shared with any other function. Apparently they appreciate to a great extent their own outpourings, and, if we may interpret their feelings by human standards, are conscious that their musical offerings entitle them to an audience.

Not only do their bright colors suggest a tropical origin of our Warblers, but their whole make-up is in keeping with tropical surroundings. Warblers are thinly feathered and delicately organized and most of them incapable of withstanding any great degree of cold. They are also almost exclusively insect eaters, only a few of the family being at all vegetarian, and these only to a comparatively small extent.

Hence, with them, migration is not a matter of choice, but is imperative. They come to us on a particular errand for a few short months, and when family cares are at an end, back they hie to the Tropics. Thus the true home of our Warblers is not where they nest, but where they spend three-fourths of their lives—not the north, but the south—not in the Temperate, but in the Tropical Zones.

THE SPECTACULAR MIGRATION OF WARBLERS

That wonderful phenomenon, bird migration, is illustrated by no birds more clearly and convincingly than by our Wood Warblers. Assuredly few other birds—unless it be the waterfowl—migrate in such a spectacular manner. (See, also, "Our Greatest Travelers—Migratory Birds," in this volume.)

The stroller, in late August or September, finds himself in the woods, the silence being broken only by the drumming of a distant Partridge, the chirping of insects, or other familiar sounds which only emphasize the general quiet that prevails.

Presto! The scene changes! The woods, apparently almost tenantless but a mo-

ment before, are now filled with life of the most animated and intense kind. Every shrub, every tree, has its feathered occupant. Our observer recognizes perhaps a dozen or twenty species, representing several distinct families; but prominent among them, by reason of numbers, variegated plumage, graceful forms, and active motions, are the Wood Warblers.

Every individual is alert and busy, gliding from one twig to another near by, or flying from one tree to the next, while from all sides come the soft calls and notes of individual members of the flock, whose friendly converse has the effect, if not the purpose, of keeping the individuals of the assemblage in touch with each other and with the flock as a unit. In a few moments silence again reigns where all was commotion and activity. The birds have passed on their seemingly aimless course.

If the observer would learn the solution of the mystery of the birds' evident hurry, he has only to follow them for a time, when he will find that, however erratic may seem the course of individual members, the flock as a whole is steering a tolerably straight course southward. In other words, he is in the midst of a flock of birds en route to their winter quarters and, in order to economize time, feeding as they go.

This, however, is not the only way Warblers migrate, nor is it the most important, since the greater part of the long journey of many is performed by night.

Any one with good ears has only to listen on a clear, calm night in fall to hear hundreds of Warblers and other birds as they flit by, a few hundred yards above the earth, the call notes coming incessantly out of the darkness. The route of these flying hosts often carries them above cities, and one cannot be insensible to the incongruity between his surroundings and the woodland scenes, so vividly brought to mind by the lisping notes coming from the darkness overhead.

LONGFELLOW'S TRIBUTE TO MIGRATORY BIRDS

The subject of migration has not inspired our poets so often as might be expected, but Longfellow, in his "Birds of Passage," gives us the following wonderfully suggestive lines:

But the night is fair,
And everywhere
A warm, soft vapor fills the air,
  And distant sounds seem near;
And above, in the light
Of the star-lit night,
Swift birds of passage wing their flight,
  Through the dewy atmosphere.

I hear the beat
Of their pinions fleet,
As from the land of snow and sleet
  They seek a southern lea.
I hear the cry
Of their voices high,
Falling dreamily through the sky,
  But their forms I cannot see.

Probably because insects constitute such an important part of their food, Warblers, as a rule, migrate early in fall and late in spring. It is true that in fall many linger till frosts nip the vegetation; but insects are abroad even later than this, and it is only necessary to watch these late migrants for a short time to learn that their search for insects is being well rewarded.

Only a few species come north early in spring, the great bulk of the Warblers evidently having been taught by bitter experience that in spring, at least, it is not the early bird that finds most worms or finds them most easily.

FLOCKING OF SMALL BIRDS

Just why small birds, when migrating, congregate in large flocks and troop through the woodlands has often been the subject of speculation. Juncos, several species of Sparrows, Woodpeckers, Nuthatches, Chickadees, Creepers, and, above all, Warblers, combine to swell the ranks of these migrating companies. As many as a dozen or more species of Warblers may often be seen in one flock, which, in addition, may include 200 or 300 individuals, representing a number of families whose tastes and habits in every-day life differ very widely.

Yet here are these incongruous elements mingling on terms of the utmost friendliness. Since birds are sociable beings, except during the short time when family cares prompt to jealous vigilance, sociability alone may be the bond of union; added, however, to the kindly feeling of companionship probably is a feeling of increased security which comes from numbers. Certainly no enemy can approach one of these bird assemblages

Photograph by William L. Finley and H. T. Bohlman

A LONG CLIMB TO A RED-TAILED HAWK'S NEST (SEE PAGES 56-57)

A Red-tail likes to get the highest place for his aerie, so he can have a good outlook. This one, in the central part of California, was 80 feet from the ground in a eucalyptus tree. While the Red-tail feeds to some extent upon birds, it is of economic importance to man on account of its insistent warfare waged against field mice and other rodents.

without being spied by at least one pair of vigilant eyes, when the flock is immediately notified by a few sharp chirps—warning for every individual to seek safety in flight or to scurry to cover.

WHAT MYSTERIOUS SENSE GUIDES THEM IN THEIR LONG JOURNEYS?

In what manner Warblers migrate—that is, how they are guided on their long journeys—is a moot question. Little mystery attaches to their ability to find their way north or south in daylight, since the recognizable landmarks are many and prominent. As most birds, especially the Warblers, choose starlight and moonlight nights for their trips, perhaps they are similarly guided by night, and natural landmarks, such as mountains, rivers, and the coastline may point out much, if not all, of their way.

However plausible this explanation may sound in the case of birds migrating over land, it utterly fails when applied to migrants whose journeys north and south necessitate flights over long stretches of ocean, in some instances at least 2,000 miles, quite out of sight of land and of all landmarks.

In seeking an explanation of the mystery of birds' ability to find their way under such circumstances, many are inclined to reject the one-time sufficient answer, "instinct," in favor of the more recent theory, the possession by birds of another faculty, the so-called "sense of direction."

But, in the case of our Wood Warblers, there is little need of appealing to another sense to guide them in migration, or, indeed, to anything out of the ordinary save excellent memory and good eyesight. The five-hundred-mile flight toward the Tropics across the Gulf of Mexico is made by preference, and however it originated as a fly line, had it proved to be extra hazardous, it might have been abandoned at any time in favor of the apparently safer West Indian route.

WHY WARBLERS MIGRATE

But, after all, the Gulf trip involves few hazards other than those connected with storms, since the flight across the water, even at a slow rate, would necessitate a journey of less than 24 hours, and this, no doubt, is quite within the capacity of even the smallest and weakest of the family. Moreover, the South American Continent is too big a mark to be easily missed, and an error of a few hundred miles east or west would make little difference in the safety of the birds.

It may be set down as an axiom that all birds which travel south in fall do so because they must migrate or freeze or starve. Why some of them leave early, when food in their summer home is seemingly so abundant, is indeed a puzzle. Once the nestlings are on the wing and ready for the journey, off they go, old and young.

Nevertheless, by an apparently premature start they only anticipate by a few weeks the time of scarcity when they must go, and perhaps the lesson of bitter experience in the history of the several species has taught them to go when all the conditions are favorable.

It is true that every winter a few birds, often a few individuals of a given species, winter far north of the customary winter home. Some of these are evidently stragglers or wanderers which, for some unexplained reason, failed to accompany the rest of their kind on the southward migration. They in nowise affect the general statement, being exceptional in every way.

MALE HUMMING BIRDS DESERT THEIR FAMILIES

A few of our Warblers in Florida and on other parts of our southern coast do not migrate; but the almost universal rule in the family is to abandon the summer home when the care of the young ceases and to go far southward ere they stop for the winter. Indeed, the males of many species do not trouble themselves much with the care of the nestlings, but prepare to migrate before the young are well on the wing.

A still more flagrant case is that of the Humming Birds. The male deserts the female when she is still on her eggs, shifting the responsibility of caring for the family entirely on her devoted head, while he disports himself among the flowers, leaving for the south long before his exemplary mate and the young are ready.

Some of our species, however, while migrating southward, are satisfied to re-

main all winter within our boundaries. Thus the Pine and Palm Warblers winter in the Gulf States, while a greater or less number of individuals, representing several species, winter in southern Florida. The great majority, however, winter south of the United States, in Central and South America.

Thus Professor W. W. Cooke tells us: "The Prairie, Black-throated Blue, Swainson's, Bachman's, Cape May, and Kirtland's Warblers go only to the West Indies. The Worm-eating, Myrtle, Magnolia, Chestnut-sided, Black-throated Green, Hooded, Blue-winged, Nashville, Orange-crowned, Parula, Palm, and Wilson's Warblers, and the Chat, go no farther than Central America, while many species spend the winter in South America, including some or all the individuals of the Black and White, Prothonotary, Golden-winged, Tennessee, Yellow, Cerulean, Bay-breasted, Black-poll, Blackburnian, Kentucky, Connecticut, Mourning, and Canada Warblers, the Redstart, Ovenbird, and both the Water Thrushes. Nearly all the Warblers of the western United States spend the winter in Mexico and the contiguous portions of Central America."

The northward journey in spring, away from the land of sunshine and plenty to the land of uncertain spring weather, is another matter. Probably if all birds that habitually abandon the north and winter in the south were to nest there, their quota, added to the number resident in the Tropics, would be too great for the means of subsistence.

Nevertheless, birds are not forced away from their winter quarters by inclement weather or impending famine, but by the subtle physiological change which warns them of the approach of the mating season and fills them with new desires, among which is the compelling one of a return to the spot where they first saw the light, or where they reared last season's brood.

VAST NUMBERS OF BIRDS SUCCUMB IN MIGRATIONS

Whatever the cause, the birds are not discouraged by the many and great perils that attend migration, and vast numbers every year succumb to them. Storms, especially offshore winds, constitute the gravest peril, and there is abundant evidence that millions of birds are annually blown out to sea to find watery graves. Perhaps no family suffers more in the aggregate than the Warblers. Thinly feathered, delicately organized, highly insectivorous, they are exposed to unusual dangers while birds of passage to and from their nesting grounds.

It is a matter of common observation that every few years in some given locality, perhaps embracing a region of considerable size, a particular species of Warbler or other bird suddenly becomes rare where before common. After a season or so, though sometimes not for years, the equilibrium is reëstablished and the numbers are as before. These changes very probably are the visible signs of migration catastrophes, the result of the sweeping away of a migration wave, composed of one or of many species, in the path of some sudden storm.

Again, many of us have observed the dire effects of a prolonged rain and sleet storm in spring, when thousands of luckless migrants find only too late that they have prematurely left the warmth and plenty of their tropical winter refuges. Under such circumstances thousands of migrants perish from the combined effects of cold and starvation, and among them are sure to be great numbers of Warblers.

THE ECONOMIC VALUE OF WARBLERS AS INSECT DESTROYERS

From the esthetic point of view, our Warblers, as a group, occupy a high and unique position. They also occupy no uncertain place in the list of our useful birds. Preëminently insectivorous, they spend their lives in the active pursuit of insects. They begin with the eggs, preying upon them whenever and wherever found, and continue the good work when the egg becomes the larva and when the larva becomes the perfect insect.

They are especially valuable in this respect because of the protection they lend to forest trees, the trunk, bark, and foliage of which they search with tireless energy.

Their efficiency is vastly increased because the many different species pursue the quest for food in very different ways. While some confine their search chiefly

to the trunks and large branches and examine each crack and crevice in the bark for eggs or larvæ, others devote their energies to the twigs and foliage, scanning each leaf and stem with eager eyes. Still others descend to the ground and examine the rubbish and grass for hidden prey, while nearly all are adept at catching insects on the wing.

ALL THE WAKING HOURS OF WARBLERS ARE DEVOTED TO FOOD-GETTING

Each species, however, has a method of its own, more or less unlike that of its fellows, and each excels in some specialty. Not only does the group as a whole specialize on insects, but each individual member of the group still further specializes, so as to leave no loophole for the escape of the enemy.

The quantity of animal food required to drive the avian engine at full speed is so great that it is no exaggeration to say that practically all the waking hours of our Warblers, from daylight to dark, are devoted to food-getting. What this never-ceasing industry means when translated into tons-weight of insects, it is impossible even to guess, but the practical result of the work of our Warblers and other insectivorous birds is that we still have our forests, and shall continue to have them so long as we encourage and protect the birds.

In the case of orchards and shade trees, there are other means at our disposal of controlling the insect enemy, notably the use of sprays. Sprays are very important, since birds are too few in number immediately to control insect outbreaks, especially nowadays, when the number of destructive native insects has been so greatly increased by importations from all quarters of the globe. But for the preservation of our forests we must rely largely upon our birds, since the use of sprays or of other agencies over our vast woodland tracts would be too expensive, even were it not quite impracticable for many other reasons.

SHRUBBERY SHOULD BE PLANTED NEAR HOUSES FOR NESTING WARBLERS

Insects are very numerous, and there is reason to believe that much benefit would result if we could multiply the present number of their enemies—the birds. The erection of bird boxes and shelters is an easy way to increase the number of certain species of birds, such as Swallows and Chickadees. Unfortunately, with few exceptions, our Warblers do not build their nests in cavities, and hence cannot be induced to occupy bird boxes. Many of them, however, nest in bushes, vines, and shrubbery, and by planting clumps of these near houses something can be done toward increasing the numbers of certain species, such as the Yellow Warbler and the Redstart.

Because our Warblers are chiefly insectivorous, their food habits bar them from the usual bird lunch-counter in times of hard storms.

PROWLING CATS ARE IMPLACABLE FOES OF WARBLERS

During migration, Warblers are peculiarly exposed to the danger of prowling cats. Many species feed close to or even on the ground, and then they are so much concerned with their own business that any tabby, however old and lazy, is equal to catching one or more individuals daily. The bird lover can do good service by summarily disposing of vagrant cats, which, during migration, work havoc in the ranks of our small birds.

The pernicious activities of pet cats should also be restrained, for these, however well fed, are still subject to the predatory instincts of their wild ancestry, which impel them to stalk a live bird with all the zeal and cunning of their forbears.

Little difficulty is experienced, even by the tyro, in distinguishing Warblers from other birds, but to recognize the several species is not so easy, particularly as the adult males and females of many species are markedly dissimilar, while the young, both in the first and second plumages, often differ from the adults. So far as possible the various plumages are shown in the illustrations of Mr. Fuertes, which are so admirable as to do away with the need of descriptive text.

All of the color illustrations are approximately one-half life size.

MARYLAND YELLOW-THROAT (Geothlypis trichas and subspecies)

Length, about 5⅓ inches. Mostly green above, yellow below. Distinguished from other Warblers by a broad black band across the forehead, bordered narrowly with white.

Range: Breeds from southern Canada to southern border of Mexican tableland; winters from southern United States to Costa Rica.

Characteristics: This little Warbler is common throughout the United States and southern Canada, frequenting thickets and low bushes on swampy ground. He is not a tree lover, but spends most of his time on or very near the ground, where he hunts assiduously for caterpillars, beetles, and various other small insects. Among the pests that he devours are the western cucumber beetle and the black olive scale.

He has a cheery song of which he is not a bit ashamed, and when one happens to be near the particular thicket a pair of Yellow-throats has chosen for its own, one has not long to wait for vocal proof that the male, at least, is at home.

The Yellow-throat has the bump of curiosity well developed, and if you desire a close acquaintance with a pair you have only to "squeak" a few times, when you will have the pleasure of seeing at least one of the couple venture out from the retreat far enough to make sure of the character of the visitor.

YELLOW-BREASTED CHAT (Icteria virens and subspecies)

Length, about 7½ inches. Its size, olive-green upper parts, and bright yellow throat, breast, and upper belly distinguish this bird at a glance.

Range: Breeds from British Columbia, Montana, Wisconsin, Ontario, and southern New England south to the Gulf States and Mexico; winters from Mexico to Costa Rica.

Characteristics: The Chat is one of our largest and most notable Warblers. It is a frequenter of brushy thickets and swampy new growth, and, while not averse to showing itself, relies more upon its voice to announce its presence than upon its green and yellow plumage.

Not infrequently the Chat sings during the night. The song, for song we must call it, is an odd jumble of chucks and whistles, which is likely to bring to mind the quip current in the West, "Don't shoot the musician; he is doing his best." In this same charitable spirit we must accept the song of the Chat at the bird's own valuation, which, we may be sure, is not low.

Its nest is a rather bulky structure of grasses, leaves, and strips of bark, and is often so conspicuously placed in a low bush as to cause one to wonder how it ever escapes the notice of marauders fond of birds' eggs and nestlings.

The Chat does no harm to agricultural interests, but, on the contrary, like most of the Warbler family, lives largely on insects, and among them are many weevils, including the alfalfa weevil and the boll weevil, so destructive to cotton.

OVENBIRD (Seiurus aurocapillus and subspecies)

Length, a little over 6 inches. Above mostly olive green; below white, breast and sides streaked with black.

Range: Breeds from southern Mackenzie, Ontario, southern Ungava, and Newfoundland south to Wyoming, Kansas, southern Missouri, Ohio Valley, and Virginia; also in mountains of Georgia and South Carolina; winters in southern Florida, southern Louisiana, Bahamas, West Indies, and southern Mexico to Colombia.

Characteristics: The Ovenbird is one of our best-known Warblers and one the woodland stroller is sure to get acquainted with, whether he will or no, so common is it and so generally distributed. In moments of ecstasy it has a flight song which has been highly extolled, but this is only for the initiated; its insistent repetition of "teacher, teacher, teacher," as Burroughs happily phrases it, is all the bird vouchsafes for the ears of ordinary mortals.

Its curious domed-over grass nest is placed on the ground and is not hard to find. The food of the Ovenbird does not differ greatly from that of other Warblers, notwithstanding the fact that the bird is strictly terrestrial in habits. It consists almost exclusively of insects, including ants, beetles, moths, spanworms, and other caterpillars, with a few spiders, millepeds, and weevils.

RED-FACED WARBLER (Cardellina rubrifrons)

Range: Mainly in Transition Zone in mountains of southern Arizona and southwestern New Mexico and south through Mexico to the highlands of Guatemala.

Characteristics: So differently colored from our own North American Warblers generally is the little Red-face that one might at once suspect it to be a stranger from a strange land. So at least it seemed to me when, in the mountains near Apache, Arizona, in July, 1874, I saw the first one ever detected within our borders. Later in the same year I found others on Mount Graham. It is a Mexican species which has obtained a foothold along our southern borders in Arizona and New Mexico. As I noted at the time, I saw flocks of ten or fifteen among the pines and spruces, the birds frequenting these trees and only rarely being seen on the bushes that fringed the stream.

In habits Red-faced Warblers are a rather strange compound, now resembling the Common Warblers, again recalling the Redstart, but more often, perhaps, bringing to mind the less graceful motions of the familiar Titmice. Their favorite hunting places appear to be the extremities of the limbs of spruces, over the branches of which they quickly pass, with a peculiar and constant sidewise jerk of the tail.

Since 1874 other observers have had a better chance to study this bird and a number of nests have been taken. These were under tufts of grass, and in the case of one found by Price was "such a poor attempt at nest-building and made of such loose material that it crumbled to fragments on being removed."

MARYLAND YELLOW-THROAT
Female, upper; male, lower

OVENBIRD

YELLOW-BREASTED CHAT

RED-FACED WARBLER

WORM-EATING WARBLER (Helmitheros vermivorus)

Range: Breeds mainly in the Carolinian Zone from southern Iowa, northern Illinois, eastern and western Pennsylvania, and the Hudson and Connecticut River valleys south to southern Missouri, Tennessee, Virginia, and mountains of South Carolina; winters from Chiapas, Mexico, to Panama, in Cuba and the Bahamas.

Characteristics: He who would make the acquaintance of the Worm-eating Warbler must seek it in its chosen home, far from which it never strays. It is a bird of shaded hillside and dark thickets along watercourses. Though nimble in its movements and an active insect hunter, it is an unobtrusive little Warbler, garbed in very modest colors, and is likely to escape the notice of the unobservant.

There seems to be an unusual degree of jealousy among the males, and a pair, the hunting and the hunted, are often seen pursuing a rapid, zigzag flight through trees and bushes.

Of the musical ability of the Worm-eating Warbler little is to be said save that his song is so very feeble that one must listen carefully to hear it at all. This Warbler nests on the ground, often on a hillside or in a shallow depression, and the pairs seem so much attached to their old home that they may confidently be looked for in the same place year after year.

GOLDEN-WINGED WARBLER (Vermivora chrysoptera)

Range: Breeds in Alleghenian Zone from central Minnesota, southern Ontario, and Massachusetts south to southern Iowa, northern Illinois, northern Indiana, northern New Jersey, and northern Georgia; winters from Guatemala to Colombia.

Characteristics: Though less gaudily colored than certain others of our Warblers, the Golden-wing ranks high in the family for beauty, and its trim form and tastefully contrasted tints of gray, black, and yellow may well excite admiration. It is almost wholly limited to Eastern States, rarely indeed being found west of the Mississippi and its summer haunts are in the northern parts of its range. Though common in some localities, the Golden-wing in most places is sufficiently rare always to interest the bird observer.

The bird is to be looked for in deciduous timber, and is especially fond of elms and birches as hunting grounds. Like the Blue-wing, it has the habit of clinging to the tip of a branch or cluster of flowers, back downward, scrutinizing the spot with great care.

Once heard, its song is not to be forgotten nor mistaken for that of any other Warbler, unless possibly the Blue-wing. It possesses a buzzing, insectlike quality and is well represented to my ears by the syllables *ze-ze-ze-ze*, the latter notes in a high pitch.

It seems strange that a bird so distinctly arboreal in habits should choose to nest on the ground; but numerous nests of the Golden-wing have been found, all of them practically on or a few inches from the earth, though usually supported by weed stalks or grass stems.

ORANGE-CROWNED WARBLER (Vermivora celata and subspecies)

Range: Breeds in lower Hudsonian and Canadian Zones from Kobuk River, Alaska, southeast to central Keewatin and Manitoba, and south in the mountains to New Mexico and northern Lower California; winters in the southern United States, Mexico, and Guatemala.

Characteristics: The Orange-crowned Warbler is much better known as a migrant, especially a fall migrant, than as a summer resident. Its summer home, in fact, is so far north that it is beyond the ken of most observers, although the bird occasionally summers, and no doubt nests, in Maine and Wisconsin. Of late years the Orange-crown seems to be a much commoner migrant in Massachusetts, and perhaps generally in New England than formerly, and the sight of three or four in a day occasions no great surprise. It winters in Florida and in other of the South Atlantic States, and the cause of its rarity in the Eastern States in spring is due to the fact that it migrates up the Mississippi Valley.

The Orange-crown is one of the most plainly colored of the Warbler tribe, and there is little about it to attract the notice of the casual observer. The song is said to consist of a few sweet trills, and, as is the case with the ditties of so many of its kind, has been likened to that of the familiar little "Chippy."

BLUE-WINGED WARBLER (Vermivora pinus)

Range: Breeds from southeastern Minnesota, southern Michigan, western New York, Massachusetts (rarely), and southern Connecticut south to northeastern Kansas, central Missouri, Kentucky, Maryland, and Delaware; winters from southern Mexico to Nicaragua.

Characteristics: Like the Golden-wing, the Blue-winged Warbler is confined to the Eastern States, but it ranges considerably farther west than that species and occurs almost or quite to the Plains. The Blue-wing is in many ways an inconspicuous member of the Warbler group, but, because of its perplexing relationship with the Golden-wing, Brewster's Warbler, and Lawrence's Warbler, its ornithological interest is excelled by few. Like the Golden-wing, it prefers deciduous trees and second growths and shuns the deeper parts of the forests. It has the habit—shared by the Golden-wing and Chickadee—of hanging from the under side of any particular cluster it wishes to investigate.

The ordinary song of the Blue-wing is comparable to the Golden-wing's, being little else than an apology for a song, with the same insectlike quality. This Warbler, though of distinctly arboreal habits, prefers to nest on the ground, or a few inches above it, in a tuft of grass, a clump of goldenrods, or at the foot of a sapling.

The nest is rather bulky, composed of leaves and grasses, put together after the artless manner of its kind; but it is usually well concealed by the surrounding screen of grass or weeds, from any but chance discovery.

WORM-EATING WARBLER

ORANGE-CROWNED WARBLER

GOLDEN-WINGED WARBLER
Male, upper; female, lower

BLUE-WINGED WARBLER

BLACK AND WHITE WARBLER (*Mniotilta varia*)

Length, about 4¼ inches. Easily known by its streaked black and white plumage.

Range: Eastern North America. Breeds from central Mackenzie, southern Keewatin, northern Ontario, Newfoundland, Nova Scotia, and New Brunswick to eastern Texas, Louisiana, central Alabama, and northern Georgia, west to South Dakota; winters in Florida and from Colima and Nuevo León to Colombia, Ecuador, and Venezuela.

Characteristics: A Warbler in form and general make-up, a Creeper by profession and practice, this readily identified species, in its striped suit of black and white, may be observed in any bit of Eastern woodland. Here it flits from tree to tree or climbs over the trunks and branches, scanning every crack and cranny for the insects that constitute its chief food.

Though not a lover of open country, it frequently visits the orchard where it performs its part in the task of keeping insect life in bounds. It nests on the ground and hides its domicile so skillfully that it is not often found. None of the Warblers are noted as songsters, but the Black and White Creeper, as I like best to call it, emits a series of thin wiry notes which we may call a song by courtesy only. In scrambling over the trunks of trees it finds and devours many long-horned beetles, the parents of the destructive root-borers; it also finds weevils, ants, and spiders.

YELLOW WARBLER (*Dendroica æstiva* and subspecies)

Length, little more than 5 inches. Mostly yellow, breast and belly streaked with reddish brown.

Range: North America, breeding generally throughout its range from tree limit south to central Mexico; winters from Mexico to Brazil and Peru.

Characteristics: The "Yellow Bird," or Wild Canary, as it is sometimes called, is one of the commonest of the Warbler tribe and ranges over a vast extent of territory, being found here and there from ocean to ocean. Unlike some of its relatives, it prefers open thickets, especially of willows, to dense woodland, and often builds its pretty nest by the roadside or in garden shrubbery.

Though not an expert musician, the Yellow Warbler sings early and often, and in zeal makes up what it lacks in quality of voice. Because its nest is easily found by the initiated, this Warbler is often victimized by the infamous Cowbird, and is forced to bring up one or even two young Cowbirds in place of its own rightful progeny. It is pleasant to be able to record the fact that sometimes the clever Warbler knows enough—how it knows it is another matter—to evade the unwelcome responsibilities thus thrust upon it, and builds a platform over the alien egg, and then continues its domestic affairs as originally planned. Indeed, cases are on record when two Cowbirds' eggs have been found in a nest, each covered up by a separate layer of nest material.

AUDUBON WARBLER (*Dendroica auduboni* and subspecies)

Length, about 5 inches. Much like the Yellow-rump, but with yellow crown and throat patch.

Range: Breeds from central British Columbia, Alberta, and southwestern Saskatchewan, south in mountains to Guatemala; winters from California and Texas south to Guatemala.

Characteristics: No member of the Wood Warbler family is more characteristic of the group than this beautiful bird. In voice, coloration, and habits it is almost the counterpart of the Yellow-rump of the Eastern States, for which indeed it might easily be mistaken were it not for its yellow throat, the corresponding area in the Yellow-rump being white.

It summers in the mountains and shows off to advantage against the dark foliage of the pines. It seems to have little fear of man and in winter frequents orchards, gardens, and dooryards. Wherever it may be, it keeps up an incessant hunt for its insect food, in the pursuit of which, like many others of its family, it sometimes essays the rôle of Flycatcher, being very expert and nimble on the wing. This Warbler also devours large numbers of ants, flies, scale and plant lice, and noxious bugs.

REDSTART (*Setophaga ruticilla*)

Length, nearly 5½ inches. To be distinguished from other Warblers by its coloration and its motions (see below).

Range: Breeds from central British Columbia and eastern Canada to Washington, Utah, Colorado, Oklahoma, and North Carolina; winters in the West Indies and from southern Mexico to Ecuador.

Characteristics: Its beauty of form and plumage and its graceful motions place this dainty bird at the head of our list of Wood Warblers—a place of distinction indeed. The bird appears to be the incarnation of animated motion and fairly dances its way through the forest. Spanish imagination has coined a suggestive and fitting name for the Redstart, *Candelita*—"little torch-bearer." The full appropriateness of the name appears as the graceful creature flits through the greenery, displaying the salmon-colored body and the bright wing and tail patches.

The Redstart is not unknown in some parts of the West, but it is essentially a bird of the Eastern States, where it is a common inhabitant of open woodland districts.

While this Warbler builds a rather neat and compact structure of strips of bark, plant fibers, and the like, placing it in a sapling not far from the ground, the nest is not the thing of beauty one might be led to expect from such a fairylike creature.

Ornamental as the Redstart is, it possesses other claims on our gratitude, for it is a most active and untiring hunter of insects, such as spittle insects, tree-hoppers, and leaf-hoppers, and both orchard and forest trees are benefited by the unceasing warfare it wages.

BLACK AND WHITE WARBLER

AUDUBON WARBLER

YELLOW WARBLER

REDSTART
Female, upper; male, lower

NASHVILLE WARBLER (Vermivora ruficapilla and subspecies)

Range: Breeds in Canadian and Transition Zones from southern British Columbia, Saskatchewan, central Quebec, and Cape Breton Island south to central California, Nebraska, northern Illinois, northern Pennsylvania, northern New Jersey, and Connecticut; winters in southern Mexico and Guatemala.

Characteristics: As Wilson never saw but three individuals of the Nashville Warbler, all taken near Nashville, Tennessee, he named his discovery for that city, apparently believing it to be a local species. It is now known to inhabit most of the eastern United States. Without doubt the bird is much more common than it was in Wilson's time, perhaps due to the fact that second growth and areas of low woods, its preferred haunts, have largely replaced the denser forests of the early part of the nineteenth century.

One cannot wander far afield in New England in summer time without hearing this Warbler's song or songs, since it is not only a frequent and vivacious chorister, but has a number of ditties in its repertoire, including a flight song.

I never found but one nest, and this was on a little pine-wooded knoll in a small depression in the earth, only partially concealed by thin grass. I should never have found it but for the fact that the bird flushed from between my feet. So far as known, the Nashville always nests on the ground. Its preference for the ground as a nesting site is the more remarkable, since the bird rarely or never hunts there, but prefers to seek its insect food among the foliage, often of the tallest elms and chestnuts and other giants of the forest.

The Calaveras Warbler (*Vermivora ruficapilla gutturalis*) is a form closely allied to the Nashville, but confined chiefly to the Pacific coast, extending eastward to eastern Oregon and northern Idaho.

TENNESSEE WARBLER **(See text, page 102)**

PARULA WARBLER (Compsothlypis americana and subspecies)

Range: Breeds mainly in Transition and Austral Zones, from eastern Nebraska, northern Minnesota, central Ontario, and Anticosti and Cape Breton islands south to central southern Texas, southern Louisiana, Alabama, Virginia, and Maryland; winters probably in the Bahamas and West Indies to Barbados, and from Vera Cruz and Oaxaca to Nicaragua.

Characteristics: The beautiful Parula, smallest of our Warblers, with prevailing colors blue and yellow, is generally distributed during migration and usually found in company with other Warblers in leafy trees. It is one of the most active of the tribe, and is untiring in its pursuit of the minute insects which form its food. Its habit of hanging head downward as it explores a cluster of blossoms suggests a Chickadee, and the little fellow is a combination of Warbler, Kinglet, and Chickadee. It is very partial to nesting in usnea moss and so is found in summer along streams or in swampy localities where long streamers of the usnea festoon the trees. The preference of the Parula for this moss as a site for its nest is exemplified by a nest I once found in Maryland on the bank of the Potomac, which had been built in the frayed end of an old rope hanging to a sapling and which a short distance away looked to me—and no doubt to the bird—exactly like a clump of usnea. As no usnea occurred in this locality, the bird accepted the frayed rope as a satisfactory substitute, and in so doing followed the spirit if not the letter of a family tradition.

The Parula has a short, buzzing song of which it is prodigal enough, but it is weak and can be heard at no great distance.

CAPE MAY WARBLER (Dendroica tigrina)

Range: Breeds in Canadian Zone from southern Mackenzie, northern Ontario, New Brunswick, and Nova Scotia south to Manitoba, northern Maine, and New Hampshire, and in Jamaica; winters in the Bahamas and the West Indies to Tobago.

Characteristics: Not only is the Cape May one of our most beautiful Warblers, but its rarity adds greatly to the zest with which one hails the discovery of even an individual. This species, however, is far more numerous than it used to be.

The bird is a rather sluggish, but persistent, insect hunter, though it adds to its bill of fare one item, grapes, which is bringing it into ill repute in parts of Pennsylvania and Virginia. The sharp-pointed bill of the Cape May enables it readily to puncture the skin, its apparent purpose being to satisfy its thirst with the sweet juice.

The Cape May's song is weak and squeaky and by no means worthy of so superb a creature. Comparatively little is recorded of this bird's nesting habits.

BLACK-THROATED BLUE WARBLER (Dendroica cærulescens and subspecies)

Range: Breeds in Canadian and Transition Zones from northern Minnesota, central Ontario, and northeastern Quebec south to central Minnesota, southern Michigan, southern Ontario, and in mountains to Georgia; winters from Bahamas and West Indies to Guatemala and Colombia.

Characteristics: The male Black-throated Blue Warbler is one of the most conspicuous of the Warblers. The female, despite her inconspicuous coloration, may always be identified by the white spot on the primaries. The bird is common and ranges widely through eastern North America. Though in the main a common resident of the northern woods, in the mountains it breeds as far south as Maryland, while a geographic subspecies (*Dendroica cærulescens cairnsi*) nests in the southern Alleghenies from Pennsylvania south to Georgia.

It has four main songs, on which it plays notable variations.

It builds its nest of bark, roots, and other pliant material, loose and rather bulky, in saplings, bushes, and weeds, a few inches or a few feet from the ground.

NASHVILLE WARBLER, upper;
TENNESSEE WARBLER, lower

CAPE MAY WARBLER
Male, upper; female, lower

PARULA WARBLER
Male, upper; female, lower

BLACK-THROATED BLUE WARBLER
Female, upper; male, lower

MAGNOLIA WARBLER (Dendroica magnolia)

Range: Breeds in Canadian and upper Transition Zones from southwestern Mackenzie, southern Keewatin, northern Quebec, and Newfoundland south to central Alberta, southern Saskatchewan, Minnesota, northern Michigan, and northern Massachusetts, and in the mountains of West Virginia, Maryland, Pennsylvania, and New York; winters from southern Mexico (Puebla and Chiapas) to Panama.

Characteristics: The Magnolia, or Black and Yellow Warbler, as I like best to call it, is one of our most beautiful Warblers, and, fortunately, one of the commonest of the tribe. When busy at its self-imposed task of hunting insects—and when is it not busy?—it is by no means shy, and may be watched at close range.

Whenever or however met, the sight of a full-plumaged male resplendent in the gold and black livery of spring is worth a long journey.

The bird ranges over much of eastern North America, as far west as the Plains, and toward the north reaches the Mackenzie region. In the mountains it breeds here and there as far south as Maryland.

In migration the Magnolia shows no preference for special localities, but frequents upland woods and lowland shrubbery where is promised a good harvest of insects. Few large companies of Warblers traverse gray birch woods without their complement of these beautiful and sprightly wood nymphs.

The Magnolia Warbler is a versatile, though scarcely an accomplished, songster. Many of its nests have been found in the northern woods, some of them only a few feet from the ground in small firs or spruces.

CHESTNUT-SIDED WARBLER (Dendroica pensylvanica)

Range: Breeds mainly in the Transition Zone from central Saskatchewan, northwestern Manitoba, central Ontario, and Newfoundland south to eastern Nebraska, Illinois, Indiana, northern Ohio, northern New Jersey, and Rhode Island, and south in the Alleghenies to Tennessee and South Carolina; winters from Guatemala to Panama.

Characteristics: Since the days of Wilson, Audubon, and Nuttall there is little doubt that the Chestnut-sided Warbler has increased in numbers, and within its range it is now one of the commoner of the family. It is trim of form and its colors, though not gaudy, have a quiet elegance all their own.

During the fall migration it shows little preference in its hunting grounds, but is found with others of its kin in all sorts of woodland haunts. It frequents open woodland tracts in summer and loves to nest in low thickets of hazel and barberry, usually about two feet from the ground. In favorable localities in Massachuetts I have frequently found, in a morning's search, half a dozen nests made of shreds of bark and grasses put together loosely and carelessly.

The Chestnut-side has two main songs, both of which, according to Thayer, are subject to wide variation.

BLACKPOLL WARBLER (Dendroica striata)

Range: Breeds in Hudsonian and Canadian Zones from limit of trees in northwestern Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to central British Columbia, Manitoba, Michigan, northern Maine, and mountains of Vermont and New Hampshire; winters from the Guianas and Venezuela to Brazil.

Characteristics: The Blackpoll probably heads the Warbler list in point of numbers. So far as superficial observations go, the bird is no spryer, no more industrious, and no more adept, in hunting food than its compeers; but for some reason or other, possibly greater adaptability, it seems to have succeeded beyond most of its kind in extending its breeding range and in multiplying. It is a late migrant, both spring and fall, and when the hordes of Blackpolls put in an appearance, especially in the vernal season, one may know that the end of the migrating season is at hand.

The bird nests chiefly in the Far North, though it summers as far south as the Adirondacks. As it winters in South America, there are thus at least 5,000 miles between its extreme northern and southern habitats. Chapman notes that it is one of the very few Warblers that migrate directly across the West Indies from South America to Florida. It makes its appearance in the Gulf States about the last of April.

BLACKBURNIAN WARBLER (Dendroica fusca)

Range: Breeds in lower Canadian and upper Transition Zones from Manitoba, southern Keewatin, central Ontario, Quebec, and Cape Breton Island to central Minnesota, Wisconsin, northern Michigan, Massachusetts, and Connecticut, and in the Alleghenies from Pennsylvania to Georgia and South Carolina; winters from Colombia to central Peru and less commonly north to Yucatan.

Characteristics: The Blackburnian, one of the gems of the Warbler tribe, has a rather wide range in eastern North America, extending west as far as the Plains and north to Manitoba. Apparently it is rarely, at least in migration, an abundant Warbler, and there are few field observers so seasoned to the sight of its beautiful colors as not to be thrilled by its loveliness. In migration its habits offer nothing peculiar.

The Blackburnian favors big trees, particularly hemlocks, and spends most of its life high above the ground. As Thayer says, it is the "preëminent forest Warbler of the group, the lover of deep mixed growth and the upper branches of the biggest conifers." The bird has a thin, shrill voice, and utters at least two songs or variations which some think resemble the Black-throated Green's. Whatever the site selected, be it a hemlock or a deciduous tree, the nest is placed well up among the branches and well out toward the end, where it is safe from all enemies that do not possess wings.

MAGNOLIA WARBLER
Adult, upper; immature male, lower

BLACKPOLL WARBLER
Male, upper; female, lower

CHESTNUT-SIDED WARBLER
Male, top; immature male, middle; female, bottom

BLACKBURNIAN WARBLER
Male, upper; female, lower

BAY-BREASTED WARBLER (Dendroica castanea)

Range: Breeds in Canadian Zone from northeastern Alberta, southern Keewatin, southern Ungava, and Newfoundland south to southern Manitoba, northern Maine, and mountains of New Hampshire; winters in Panama and Colombia.

Characteristics: The Bay-breast appears to be increasing in numbers. Fifty years or so ago it was rare in Massachusetts in fall, and search by the most vigilant collector during the entire autumn migration was rarely rewarded by the sight of more than one or two. To-day it is far different, and not a season passes that at the proper time and place careful search will not reveal a dozen or more mingled with others of the Warbler family.

In spring the bird has always been uncommon or altogether wanting in the Eastern States, as it migrates up the Mississippi Valley, spreading out to occupy northern Maine and other of its northern summer haunts. In summer it frequents coniferous forests, and often nests in hemlocks.

BLACK-THROATED GRAY WARBLER (Dendroica nigrescens)

Range: Breeds in Transition Zone from southern British Columbia, Nevada, northern Utah, and northwestern Colorado south to northern Lower California, southern Arizona, and northern New Mexico; winters in southern Lower California and in Mexico from Durango to Michoacán, Vera Cruz, and Oaxaca.

Characteristics: The handsome Black-throated Gray Warbler is exclusively western in distribution, from our southern border to British Columbia. Though I have seen it many times, I am unable to recall any especially salient characteristics possessed by the species.

Like others of the family, the Black-throat is an active insect hunter, both among the oaks and various kinds of scrub growths of the valleys and the conifers of higher altitudes. The bird seems naturally to suggest the Black-throated Green Warbler of the Eastern States, but I am not aware that in habits it is more nearly comparable to that species than to others. In choice of nesting sites it exhibits a wide range of taste, and nests have been found in scrub oaks, pines, and firs, and varying in height from the ground from 3 or 4 feet up to 50 feet or more.

BLACK-THROATED GREEN WARBLER (Dendroica virens)

Range: Breeds in lower Canadian and Transition Zones from west, central, and northeastern Alberta, southern Manitoba, central Ontario, northeastern Quebec, and Newfoundland south to southern Minnesota, southern Wisconsin, northern Ohio, northern New Jersey, Connecticut, and Long Island, New York, and in the Alleghenies south to South Carolina and Georgia; winters in Mexico (Nuevo León to Chiapas and Yucatan), Guatemala, Costa Rica, and Panama.

Characteristics: What true bird lover is there who does not cherish fond memories of certain birds? The very name of Black-throated Green Warbler carries me back to boyhood days and to a certain pine-crested hill in Massachusetts, from which was wafted on an early spring morning the song of this Warbler, heard by me then for the first time. The many years since elapsed have not effaced the sweet strains, and I seem to hear them now as they were borne that morning by the pine-scented spring breeze. I can vividly recall the pleasure the song occasioned and the satisfaction of having added one more bird to my small list of avian acquaintances. Those were the days of mystery, when the woods seemed filled with unknown birds, and secrets lurked in evey thicket and met the seeker at every turn. They were the times when bird books were few, keys unknown, and the keen eyes of youth far more satisfactory than the best field glasses of the present day.

The Black-throated Green is one of the commoner of our Eastern Warblers and one of the first to engage the attention of the bird student. It may be met in every kind of woodland.

It has two songs, or rather one song delivered in two different ways, sprightly, sweet, and perfectly characteristic. In summer it is partial to coniferous woods, especially white pines and hemlocks, and it frequently nests in these, though also in birches and alders.

PINE WARBLER (Dendroica pinus and subspecies)

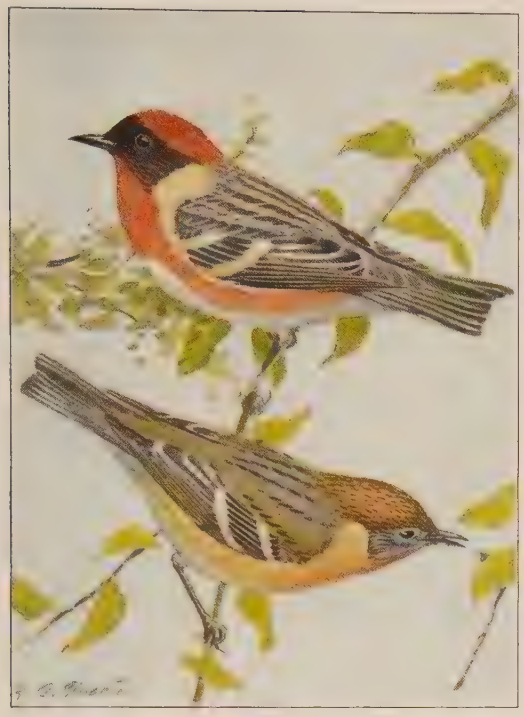
Range: Breeds in Transition and Austral Zones from northern Manitoba, northern Michigan, southern Ontario, southern Quebec, and New Brunswick south to east-central Texas, the Gulf States, Florida, and the Bahamas; winters from southern Illinois and coast of Virginia to Florida, eastern Texas, northeastern Mexico, and Bahamas.

Characteristics: Few of our birds are so aptly named as the Pine Warbler, which first, last, and all the time, except in migration, resorts to pine woods. It summers in them in the north and it winters in them in the south. Even its feathers often bear conclusive evidence of its predilection for pines, being besmeared with their gum. Among its bright-hued relatives the Pine Warbler cuts but a poor show with its somber green and brown coat, which, at least in Florida, is often dingy and smoke-begrimed from contact with burnt timber.

Though distinctively a Warbler and not a Creeper, the Pine Warbler is more deliberate in its motions than most of its kind and, somewhat in the manner of the Creeper, moves among the branches or over the trunks in search of its insect food.

For a Warbler it is an early migrant and reaches the latitude of Massachusetts soon after the middle of April. Indeed, its nest contains eggs or young while the late migrants are still passing north. Its song has little variation, but while monotonous is pleasing and sweet, far sweeter than the trill of the Chipping Sparrow, which it recalls.

Naturally the Pine Warbler nests in pines, usually rather high up, either on a horizontal limb or among the twigs at the extremity of a limb.



BAY-BREASTED WARBLER
Male, upper; female, lower

BLACK-THROATED GREEN WARBLER
Male, upper; female, lower

BLACK-THROATED GRAY WARBLER

PINE WARBLER

PALM WARBLER (Dendroica palmarum and subspecies)

Range: Breeds in Canadian Zone from southern Mackenzie, central Keewatin, northern Quebec, and Newfoundland south to northern Minnesota, Maine, and Nova Scotia; winters from Louisiana, northern Florida, and the Bahamas to the Greater Antilles and Yucatan.

Characteristics: The Palm Warbler, including under this name both the Eastern and Western, or Yellow (*Dendroica palmarum hypochrysea*), representatives of the species, is for the most part an inhabitant of the Mississippi Valley and the region eastward, spending its nesting season chiefly north of our northern frontier. It is, therefore, as a spring and fall migrant that it is best known. Though often associating with other Warblers as they flit from tree to tree, the Palm Warbler keeps close to Mother Earth and not infrequently visits pastures and stubble far from cover of any sort. Favorite hunting grounds are old fences and even buildings.

Perhaps the most salient characteristic of this little Warbler is the almost incessant tip-up motion of its tail, in which respect it recalls a bird in nowise related to it—the Spotted Sandpiper, or "Tip-up," of pond and stream. It nests on the ground.

The song of the Palm Warbler is a low, faint trill, characteristically warblerlike, but in no way remarkable. It winters in great numbers in Florida, and in 1871 I found it wintering in loose flocks of considerable size near Lakes Borgne and Pontchartrain, Louisiana, where it fed chiefly on the ground and among low bushes.

PRAIRIE WARBLER (Dendroica discolor)

Range: Breeds chiefly in Carolinian and Austroriparian Zones from southeastern Nebraska, eastern Kansas, southern Ohio, central Michigan, southern Ontario, and New Hampshire south to southwestern Missouri, northern Mississippi, Florida, and the Bahamas; winters from central Florida through the Bahamas and the West Indies.

Characteristics: The Prairie, in its variegated black, yellow, and chestnut dress, is common from Florida to the New England States and from Nebraska and Kansas east to the Atlantic. There is nothing in the habits of the bird that justifies its common name, since it has no predilection for prairies or indeed for open country of any sort. In Massachusetts it frequents rocky barberry pastures on open hillsides dotted with cedars. About Washington, D. C., it frequents sprout lands, and when it first arrives from the south is found almost exclusively in groves of the Jersey scrub pine or in junipers.

The Prairie is an active insect hunter, moving rapidly among the foliage, ever and again sending forth its characteristic song. Its unusually compact and pretty nest is often placed in the crotch of a barberry bush, in junipers, or in low deciduous bushes.

WATER THRUSH (Seiurus noveboracensis and subspecies)

Range: Breeds in Boreal and Canadian Zones from tree limit in Alaska and northwestern Canada, northern Ontario, Ungava, and Newfoundland south to British Columbia, Montana, northern Minnesota, New England, and south in mountains to West Virginia; winters in West Indies and Mexico to northern South America.

Characteristics: So far as appearance, motions, and habits go, the Water Thrush is more Thrush than Warbler, and one who sees him for the first time walking sedately along with teetering tail may well be excused for declining to class him with the Warbler family. He is partial to swamps and wet places, is a ground frequenter, and in no real sense arboreal. He not infrequently visits gardens even in populous towns, and seems to be quite at home there in the shade of the shrubbery. A sharp and characteristic alarm note often calls the attention of the chance passer-by, who would otherwise overlook the bird in its shady recesses.

Few who are privileged to hear its notes will dissent from the opinion that the Water Thrush is one of the foremost of the Warbler choir. The bird is a ground builder, placing its nest under the roots of an upturned tree, or in banks.

LOUISIANA WATER THRUSH (see text, page 102)

KENTUCKY WARBLER (Oporornis formosus)

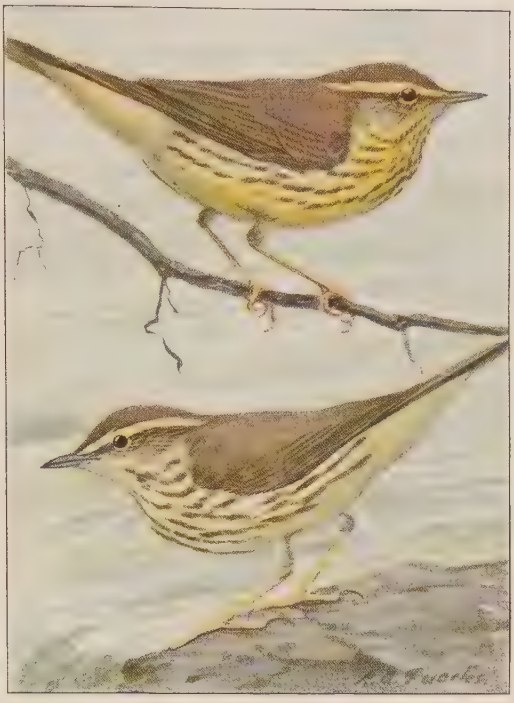
Range: Breeds in Carolinian and Austroriparian Zones from southeastern Nebraska, southern Wisconsin, southeastern and southwestern Pennsylvania, and the Hudson Valley south to eastern Texas, Louisiana, Alabama, and northern Georgia; winters from Tabasco, Campeche, and Chiapas to Colombia.

Characteristics: The Kentucky Warbler, with its rich colors and symmetrical form, is to be classed among the elect of the Warbler tribe. Moreover, while locally common it is never so abundant that it does not excite a thrill of interest in the breast of even the most blasé of bird observers. It loves the deep, dark forest and shaded ravine, where the foliage overhead casts heavy shadows on the plentiful undergrowth beneath and where even in midsummer it is moist and cool.

The bird is a persistent singer, and in its chosen haunts its loud, sweet song may be heard all day long. There is a curious resemblance between its ditty and that of the Carolina Wren, and while no one can mistake the two songs when heard close by, at a distance even the expert may be puzzled. This Warbler finds most of its food on the ground, and the thick undergrowth in which it hunts makes it difficult to learn much of its habits by observations.

It builds a rather loose, bulky nest, largely of leaves and grasses, which is placed either on or just above the ground, and although it may seem to have been rather artlessly located it is in reality well protected by the surrounding vegetation with which it blends.

PALM WARBLER, upper;
YELLOW PALM WARBLER, lower



NORTHERN WATER THRUSH, upper;
LOUISIANA WATER THRUSH, lower

PRAIRIE WARBLER
Male, upper; female, lower

KENTUCKY WARBLER
Male upper; female, lower

CONNECTICUT WARBLER (Oporornis agilis)

Range: Breeds in Canadian Zone from Manitoba to central Minnesota and northern Michigan; winters in South America, probably in Colombia and Brazil.

Characteristics: Discovered by Wilson in Connecticut early in the last century, the Connecticut Warbler remained almost unknown for many years until, September 7, 1870, I found it numerous in the fresh pond swamps of Cambridge, Mass.

The bird thus rediscovered rapidly came into the limelight, and there are few Eastern observers of the present day who are not tolerably familiar with its appearance and habits. In fall it is common throughout eastern United States in low, swampy thickets. It habitually feeds on the ground, and is so silent and shy as easily to escape the notice even of one on the lookout for it, especially as its single chirp of alarm is infrequently uttered. In fact, the only way to be sure that one or more Connecticut Warblers are not concealed in the shrubbery of a suspected locality is to beat over it systematically, not once, but many times.

When startled, the Warbler flies noiselessly to the nearest shaded perch, and there sits motionless, watching the intruder, till it decides either to renew its interrupted search for food or to seek some distant place, far from the danger of intrusion. Under such circumstances its motions are highly suggestive of the staid and quiet Thrushes, and in no respect similar to the sprightly Warblers.

The Connecticut is one of the few species that for some reason choose distinct routes of migration, as in spring it passes up the Mississippi Valley instead of through the Atlantic Coast States, which form its southern route in fall. So far as known, its nests are built on slight mounds in the midst of tamarack swamps. Only a few nests have been found up to this time.

MOURNING WARBLER (see text, page 102)

MACGILLIVRAY WARBLER (see text, page 102)

HOODED WARBLER (Wilsonia citrina)

Range: Breeds in Carolinian and Austroriparian Zones from southeastern Nebraska, southern Iowa, southwestern Michigan, central New York, and the lower Connecticut Valley south to Louisiana, Alabama, and Georgia; winters from Vera Cruz and Yucatan to Panama.

Characteristics: While the Hooded Warbler has a wide range in eastern United States, its center of abundance is the lower Mississippi Valley. It is common only locally and wholly absent from many sections except as a casual migrant. Of the bird, one of our most beautiful Warblers, Chapman says:

"To my mind there is no Warbler to which that much misused word 'lovely' may be so aptly applied as to the present species. Its beauty of plumage, charm of voice, and gentleness of demeanor make it indeed not only a lovely, but a truly lovable bird. Its haunts permit us to see this exquisitely clad creature under most favorable conditions."

WILSON WARBLER (Wilsonia pusilla and subspecies)

Range: Breeds in Boreal Zones from tree limit in northwestern and central Mackenzie, central Keewatin, central Ungava, and Newfoundland south to southern Saskatchewan, northern Minnesota, central Ontario, New Hampshire, Maine, and Nova Scotia; winters in eastern Central America from Guatemala to Costa Rica.

Characteristics: This tiny Warbler ventures farther north than many bigger and apparently hardier species, and Nelson found it in Alaska "one of the commonest of the bush-frequenting species, . . . extending its breeding range to the shores of the Arctic Ocean wherever it finds shelter." Cooke also found it in Colorado breeding from 6,000 to 12,000 feet elevation.

The Black-cap is a nervous, energetic little fellow, now essaying the rôle of Flycatcher, now hunting for insects among the foliage; ever and anon it jerks its tail up and down as if constant motion were the chief end of existence.

It has a short, bubbling, warbling song which has been likened to the songs of several other species, but which possesses a tone and quality all the bird's own. Its nest is built on the ground, is composed chiefly of grasses, and the eggs do not differ in essential respects from those of other Warblers.

It is noteworthy that the West coast form of the Black-cap Chryseola breeds as far south as Los Angeles, and that its nest, instead of being built on the ground, is usually placed in the crotch of a limb or in a bunch of weeds or nettles.

CANADA WARBLER (Wilsonia canadensis)

Range: Breeds in the Canadian Zone and casually in the Transition from central Alberta, southern Keewatin, northern Ontario, northern Quebec, and Newfoundland south to central Minnesota, central Michigan, southern Ontario, central New York, and Massachusetts, and along the Alleghenies to North Carolina and Tennessee; winters in Ecuador and Peru.

Characteristics: The Canada Warbler is always associated in my mind with the Black-cap, in company with which it is frequently found during migration. The association is purely accidental and results from a common preference for the same hunting grounds. A path or road through swampy ground, especially if bordered by old willow trees, is sure to have its quota of this Warbler and the Wilson Black-cap during migration.

Like the Black-cap, the Canada Warbler is half Flycatcher, half Warbler, and the click of the bird's mandibles as they close on some hapless insect caught in mid-aid is often the first indication of its presence. Unlike many of the family, it sings much during the spring migration. The song is loud for the size of the Warbler and is very characteristic.

The bird builds a rather bulky nest of leaves and grasses, which it places in a mossy bank or under a moss-grown log. It is an assiduous and active insect hunter and gleans among the leaves and twigs after the fashion of the Parula Warbler (see pages 92 and 93).

CONNECTICUT WARBLER; top;
MOURNING WARBLER, middle, and
MACGILLIVRAY WARBLER, bottom

WILSON WARBLER
Male, upper; female, lower

HOODED WARBLER
Male, upper; female, lower

CANADA WARBLER

TENNESSEE WARBLER (Vermivora peregrina)

(For illustration in color, see page 93)

Range: Breeds in Canadian Zone from upper Yukon Valley, southern Mackenzie, central Keewatin, southern Ungava, and Anticosti Island south to southern British Columbia, southern Alberta, Manitoba, northern Minnesota, Ontario, New York (Adirondacks), northern Maine, and New Hampshire; winters from Oaxaca to Colombia and Venezuela.

Characteristics: The Tennessee Warbler is by no means as local as its name would imply, but is likely to be found in migration almost anywhere in the eastern United States, although it is much more numerous in the Mississippi Valley. Unpretentious both in dress and character, this little bird seems to possess no very salient characteristics. It is, however, not likely to be mistaken for any other species save the Nashville, which it resembles rather closely (see pages 92-93).

During spring migration the Tennessee is apt to be overlooked, since it is prone to keep in the tree-tops. In fall, however, it is found lower down, usually in company with flocks of other Warblers, among which it becomes conspicuous by reason of its very inconspicuousness and in contrast with its more gaudy fellows.

Its song has been variously described and may be said to be a simple trill not unlike that of the Chippy. The Tennessee Warbler, like the Nashville, nests on the ground in Canada and the northern part of its range in the United States.

MACGILLIVRAY WARBLER (Oporornis tolmiei)

(See color illustration, page 101)

Range: Breeds mainly in the lower Canadian and Transition Zones from central British Columbia, central Alberta, and southern Saskatchewan south to southern California, southern Arizona, and northern New Mexico, and from the Pacific coast to the eastern foothills of the Rocky Mountains and southwestern South Dakota; winters from Lower California to Colombia.

Characteristics: Though closely resembling the Mourning Warbler in appearance and representing that bird in the West, the Macgillivray Warbler differs widely in habits. Thus it is far more generally distributed, both in the mountains and in the lowlands, and is much more numerous. In my own experiences I have found it in summer chiefly in moist thickets of willows or other brush along streams, and a suitable locality is rarely without a pair or two. Other observers, however, have found the bird on dry brushy hillsides.

This Warbler nests from a few inches to a few feet above the ground. It has a short, though pleasing, song which is repeated at brief intervals.

MOURNING WARBLER (Oporornis philadelphia)

(See color illustration, page 101)

Range: Breeds in lower Canadian Zone from east-central Alberta, southern Saskatchewan, southwestern Keewatin, Nova Scotia, and Magdalen Islands south to central Minnesota, Michigan, central Ontario, and mountains of New York, Pennsylvania, Massachusetts, and West Virginia; winters from Nicaragua and Costa Rica to Colombia and Ecuador.

Characteristics: The Mourning Warbler is a near cousin of the Maryland Yellow-throat (see pages 86 and 87), and, like that bird, sticks rather closely to Mother Earth. In the eastern United States it is one of the rarest of the warblers, but is a common species during the migration in many parts of the Mississippi Valley.

Most observers, like myself, have come across a few in migration from time to time, chiefly in spring, when the birds' habits may be described in general terms as a combination of those of the Maryland Yellow-throat and the Connecticut Warbler. During the spring migration it frequents brushy hillsides and damp thickets, and in the nesting season seems partial to briar patches, in which it places its bulky nest of leaves and stalks.

LOUISIANA WATER THRUSH (Seiurus motacilla)

(See color illustration, page 99)

Range: Breeds mainly in Carolinian Zone from southeastern Nebraska, southeastern Minnesota, and the southern parts of Michigan, Ontario, New York, and New England south to northeastern Texas, northern Georgia, and central South Carolina; winters from northern Mexico to Colombia, the Greater Antilles, Antigua, and the Bahamas.

Characteristics: The Louisiana Water Thrush, though not unlike its northern relative in general appearance, is very different in disposition and habits, and I know of no bird more shy and difficult to watch. It frequents the banks and neighborhood of clear streams that run through woodlands and tangles of laurel. One hears the sharp note of challenge or the wild ringing song, but any attempt to see the singer, unless made with the utmost caution, will end in disappointment or in a glimpse of a small, brown bird flitting like a shadow through the brush.

The song of either Water Thrush is of a high order of excellence. I cannot but think, however, that the song of the Louisiana Water Thrush gains over that of its tuneful rival by partaking somewhat of the nature of its wild surroundings, and that its song is enhanced by its accompaniments—the murmur of the woodland brook and the whisper of the foliage—among which it is heard. Few birds teeter or wag their tails as persistently as the Water Thrushes.

THE WORLD RECORD FOR FEATHERED FRIENDS

Fifty-nine Pairs of Birds Make Their Nests on a Single Acre of a Country Home Near Washington, D. C.

THE world's record for density of bird population is held by a farm within ten miles of the National Capital, near Bethesda, Md. It is owned by Dr. Gilbert Grosvenor, the President of the National Geographic Society and Editor of the NATIONAL GEOGRAPHIC MAGAZINE.

In 1913 Dr. Grosvenor bought a farm of 100 acres, half in forest and half in field, about four miles north of the District of Columbia, moving there early in the spring.

Being interested in the work of the Audubon societies, he determined to see what he and his family could do to get birds around the home. He had such success that Mr. Henry W. Henshaw, then Chief of the U. S. Biological Survey of the Department of Agriculture, became interested and delegated Dr. Wells W. Cooke to visit the Grosvenor farm.

FIFTY-NINE PAIRS OF BIRDS NESTING ON ONE ACRE

Dr. Cooke found so many birds there that he suggested a census of those living on an acre or two adjacent to the house, as he thought the count would establish a world's record. Up to that time the rec ord was held by a family at Chevy Chase, Md., which had attracted thirteen pairs of birds to half an acre.

The prospect of establishing a world's record was so inviting to the Grosvenor family that its members took a census of the nesting birds on an acre adjoining their house and barns, with the result that they found 59 pairs of birds with young or eggs in the nest on that acre, the highest number of land birds inhabitine one acre that has yet been reported to the Department of Agriculture or to any Audubon society.

A similar census was made of a second acre, and it was found that this acre had 33 pairs of nesting birds.

In an article contributed to *Bird-Lore*, the bimonthly organ of the Audubon societies of the United States, Dr. Grosvenor tells a fascinating story of the birds which have come to dwell at "Wild Acres," as his farm is named.

"Wild Acres" is a typical Maryland farm, with an old-fashioned farmhouse surrounded by an apple and pear orchard, with a vegetable garden, hedges, and open fields. Surrounding the fields is a tract of 50 acres in woods, with a beautiful stream and several springs scattered around in both the fields and the woods.

The bird census taken in the week of June 15 to June 21 showed that on the first acre they had one pair of Flickers, one pair of Bluebirds, one of Yellow Warblers, two of Orchard Orioles, two of Catbirds, one of Song Sparrows, two of Chipping Sparrows, one of Phœbes, 14 of House Wrens, seven of Robins, one of Kingbirds, and 26 of Martins.

On the second acre there were one pair each of Song Sparrows, Carolina Wrens, Flickers, Maryland Yellow-throats, Brown Thrashers, Catbirds, Chipping Sparrows, Screech Owls, and Towhees. There were also 18 pairs of Martins, four of House Wrens, and two of Robins.

HOSPITALITY AND PROTECTION ACCORDED BIRDS

"I attribute our success primarily," writes Dr. Grosvenor, "to shooting the English Sparrows and driving the cats away, to putting up many boxes, and to keeping fresh water handy at all times. We do everything we can for the comfort of our birds. For instance, we put on twigs little pieces of the oiled paper that our butter was wrapped in, and we left mud in convenient places for the Martins. The Catbirds used the oiled paper for their nests; in fact, they used all kinds of scraps. Imagine the delight of the family when, on examining one of the Catbirds'

nests in the autumn, we found one of the children's hair-ribbons and also a piece of an old dress of the baby!

"We had read a great deal about how tame birds become when they are protected, but we were constantly amazed at the quickness with which they perceived the care taken of them.

PHŒBE RAISES HER FAMILY WITHIN REACH OF HAND

"Perhaps the most remarkable nest was that of a Phœbe, which was built under the cornice of the piazza within reach of my hand. We had a little school in the morning at the house, and ten children were continually running up and down the piazza, shouting at the top of their voices; but the Phœbe went on building her nest, then hatched her eggs, and fed her young without fear, though she could see every one and every one could see her.

"I was also surprised to find how friendly birds, even of the same species, can become. For instance, we had 14 pairs of Wrens on a single acre, some of the nests being not more than 15 feet apart. We also had Robins' nests only 12 yards apart. The Bluebirds, on the other hand, do not like each other, and would not tolerate another pair of Bluebirds nearer than 100 yards.

"The first year we had no Flickers, but there was a pair nesting in an old apple tree on our neighbors' property. During the winter the tree was blown down and our oldest son obtained permission to get it. He cut out the portion of the tree which contained the nest, cleaned out the hole, and then hung the nest in a dying cherry tree. The nest was not more than ten yards from the house, but was taken possession of in 1914 and again in 1915.

"In 1915, we had 75 pairs of Martins in an area approximating 10 acres. We had one pair of Red-throated Hawks nesting in our apple orchard, and kept them for two years; but they developed such a fondness for poultry, having frequently been caught thieving, that finally we had to shoot them.

"We have in the woods a splendid pair of Barred Owls. They come around the barns at night, and I suspect them also of attempts at chicken thieving, but they are too handsome and rare a bird in these parts to shoot. We suspect Screech Owls of having been the cause of the mysterious disappearance of many young birds from their nests.

A STUFFED OWL PROVIDES FUN

"If any one wants excitement, I suggest that he buy or borrow a stuffed Owl and put it out in the garden in the daytime during the nesting season. All of the birds in the neighborhood will soon congregate, and the children will learn them more quickly than in any other way" (see illustration, page 57).

A census of the species in the 100 acres of fields and woods in Dr. Grosvenor's "Wild Acres" showed that the next summer 60 species were nesting on the farm.

Commenting upon the story of the birds at "Wild Acres," Dr. Frank Chapman, the editor of *Bird-Lore*, says:

"The birds which Dr. Grosvenor has brought about him are unquestionably more his birds than if he had shot them and placed their skins in a cabinet. With their death his responsibility for their welfare would cease. But a living bird, to which we feel we owe protection, is exposed to so many dangers that our fears for its safety are correspondingly aroused.

"These birds of our garden are our guests. Through the erection of bird-houses and by other means we have invited them to live with us, and when they accept as readily as they have with Dr. Grosvenor they make us realize not only our responsibility, but they awaken the strongest sense of hospitality."

HOW BIRDS CAN TAKE THEIR OWN PORTRAITS

By George Shiras, 3rd

Mr. Shiras is the inventor of flashlight photography of wild animals and birds and of the methods of making animals and birds take their own photographs. He is the author of numerous articles in the National Geographic Magazine, *as follows: "Photographing Wild Game with Flashlight and Camera," with 72 illustrations; "One Season's Game Bag with the Camera," with 70 illustrations; "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," with 26 illustrations; "The White Sheep, Giant Moose, and Smaller Game of Kenai Peninsula, Alaska," with 62 illustrations; "Wild Animals That Took Their Own Pictures by Day and by Night," with 67 illustrations; "Nature's Transformation at Panama," with 34 illustrations and 2 colored maps, and "The Wild Life of Lake Superior, Past and Present," with 77 illustrations.*—The Editor.

ANY ANIMAL or bird and many a reptile, however large or small, agile or cunning, may have its picture faithfully recorded during daylight or darkness, without the immediate presence of a human assistant.

While most birds and daylight-feeding animals, like the Elk, Caribou, Mountain Sheep and Goat, and small animals, such as the Squirrel and Woodchuck, present no insurmountable difficulties in photography, getting a good picture of others is often uncertain or irksome when the game photographer must either await their coming or attempt a near approach.

In many instances, owing to the nocturnal character of the animal, the keenness of scent and vision, with the habit of skulking in thick underbrush or occupying points of vantage where no approach can be made, I have usually found it a waste of effort to try to get pictures in the ordinary way; for, even if occasionally successful, the loss of time can be avoided by the use of the set camera.

CAMERA SUBSTITUTED FOR TRAP

To meet the difficulties of self-photography by creatures of the forest, I have developed methods suitable to the habits of each animal and bird subject. In the main I have used many of the devices of the trapper rather than the hunter, substituting the automatic camera for the trap and using the same baits and scents in favorable localities during the season of the year when success was likely.

The greatest immediate pleasure which comes to the camera hunter when, on foot, he can successfully stalk, or in a canoe quietly paddle up to, a big-game animal, and at other times get pictures from the recess of a well-concealed blind, can still be followed while, at the same time, there are secreted in the forest or along the waterways several cameras capable of picturing the living form of many an elusive animal, and that, too, without the loss of time or patience.

KNOWLEDGE OF ANIMALS AIDS IN GETTING PHOTOGRAPHS

In this branch of photography one should have a fair knowledge of the habits and range of the animals sought; for while there are many—if they can be located—that will seize almost any kind of bait, regardless of human scent or the appearance of a poorly concealed camera, such as the Racoon, Opossum, Skunk, Muskrat, Woodchuck, Rabbit, or Squirrel; yet in the case of others, like the Beaver, Bear, Fox, Wolf, and Deer, one should follow the cautious methods of the trapper when he erects a deadfall, sets a steel trap, or puts out poisoned bait.

Then, toward the close of the day, when the fading light puts an end to the use of the hand camera, one may expectantly visit the camera traps, and if the string across the runway is broken or the bait disturbed, the surroundings should be carefully examined for the hoof-marks of a frightened deer or the scratches made by the claws of some carnivorous animal fleeing on the click of the revolving shutter. If, however, no

Photograph by George Shiras, 3rd

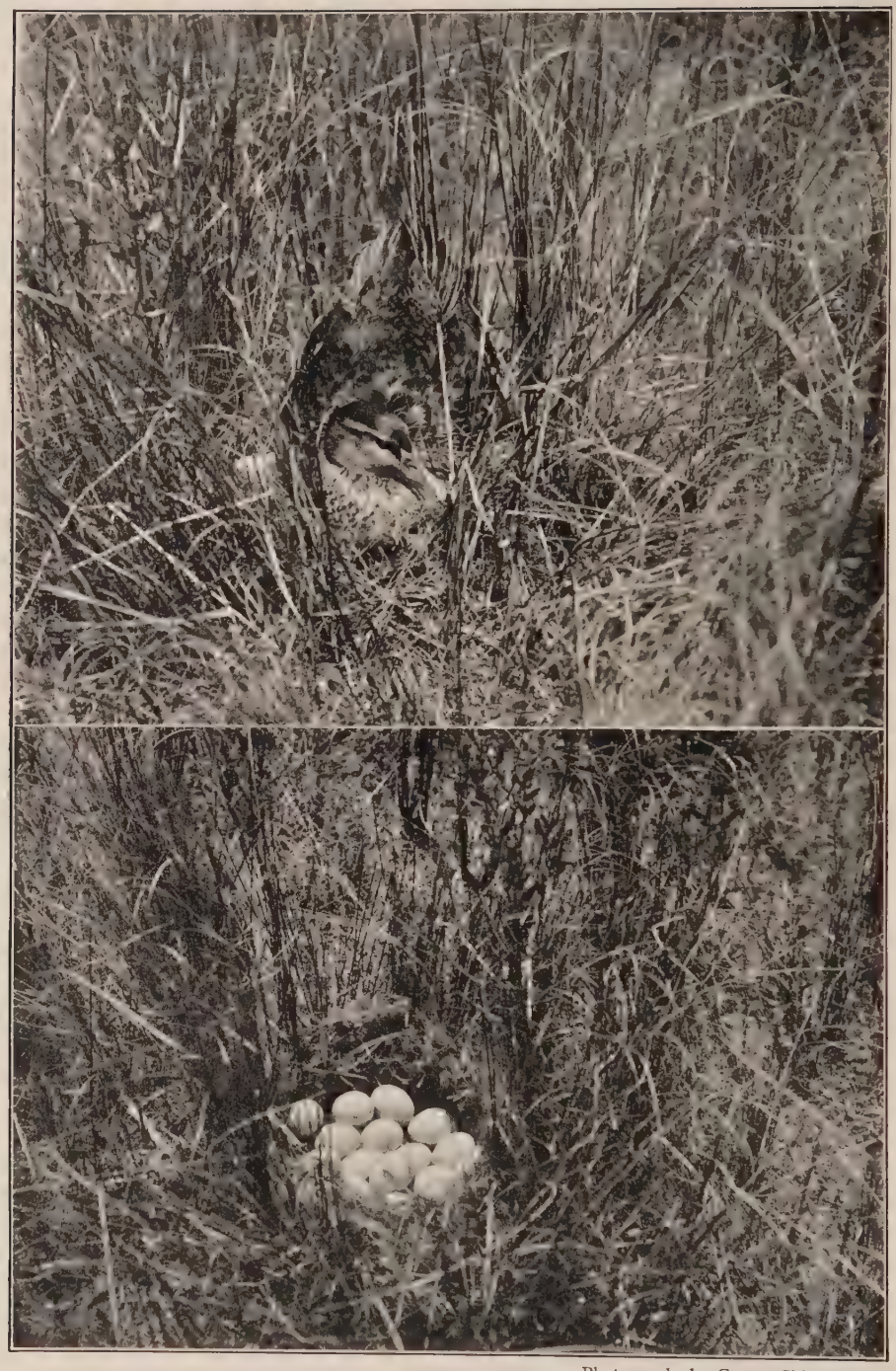
THE EGG OF A PHŒBE, AND SEVEN CONSECUTIVE DAYS' GROWTH OF YOUNG (LIFE SIZE): THE BIRD LEFT THE NEST ON THE ELEVENTH DAY

The Phœbe has forsaken the wilds and now builds its nest close to human habitations (see text and illustration in color, pages 26 and 27).

Photograph by George Shiras, 3rd

FLORIDA QUAIL TAKE THEIR OWN PICTURES

Unexpectedly a flock of seven Quail discovered the seeds put out for smaller birds. Six pictures were taken by the author who pulled the string and two by the Quail during his absence. In the above group are four cocks and two females. Note that the tugging of the cock, which is attempting to detach a seed on the string, releases the camera shutter.



Photographs by George Shiras, 3rd

A MALLARD DUCK (SEE PAGES 134-135) AND HER EGG-FILLED NEST

In the upper picture the camera sportsman has "shot" this game bird in its northern Michigan breeding ground. The lower picture indicates that the Mallard family will soon be increased by one more than a baker's dozen.

Photograph by George Shiras, 3rd

A BLACK FLORIDA VULTURE AND TAME BUZZARDS

After trying vainly for more than an hour to photograph comparatively tame Buzzards and Vultures, the author abandoned the blind behind which he had been concealed and set out his automatic camera with string and bait. On returning in half an hour he found the bait gone, and the development of the plate some hours later revealed the above picture.

visitor has come, the flashlight machine may be adjusted and the shutter of the camera reset at a much slower speed, so that when some night prowler presses against the string or eagerly pulls at the bait the flash will illuminate the surroundings while the sensitive plate records the scene.

Then, when the blazing camp-fire accentuates the darkness of the night, the sportsman, lying within the narrow circle of its warmth, may suddenly see a dazzling column of light ascend on a distant hillside, or illuminating with a momentary flutter the gloomy valley of some watercourse; and in a few seconds the deep, dull boom of the exploding powder suggests an animal fleeing in needless terror from a spot where the weapon contained no bullet and where its recorded visit will prove a source of pleasure to one who meant it no bodily harm.

ANIMALS GROW ACCUSTOMED TO FLASHLIGHTS

As I usually explode a compound of magnesium powder in a hermetically sealed box—to insure higher speed and the exclusion of moisture—I have sometimes heard the report at a distance of three miles and noticed the flash at a much greater distance.

One can imagine the surprise and terror of some timid animal when experiencing the first dazzling explosion. Yet, as will be shown later, the pangs of hunger or the cravings for some particularly choice food will lead many of these animals to return to the interrupted feast, and in the course of time the blinding light and roar seem to be regarded as harmless manifestations of Nature, like thunder or lightning. And then one may, if he desires, get a series of interesting night pictures, in every attitude and action. An example of this was shown by an article in the NATIONAL GEOGRAPHIC MAGAZINE some years ago, illustrating the nightly visits of the same coon to bait placed at the edge of a little lake.*

In taking a picture from a canoe by flashlight one must be able to judge short distances accurately in order to have the animal in proper focus. In a different way, but for the same reason, it is equally important that automatically taken pictures should come within the focus for which the camera was set in advance. With the bait placed at a given distance,

* See "A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon," NATIONAL GEOGRAPHIC MAGAZINE, June, 1911.

Photograph by George Shiras, 3rd

A BROWN THRASHER IN A FLORIDA ORANGE GROVE

little trouble arises, but when the animal sought is a deer or a moose coming to the water or feeding grounds, the problem becomes more difficult, because the intercepting string must be touched at the point where the animal will be in sharp focus.

Whenever animals are traveling on a well-defined runway, a string leading to a stake on the opposite side will insure a good picture, because the camera can be previously focused on the runway; but if such animals are to be photographed when wandering along the shores of a pond or traveling in a creek bottom, it is important that natural conditions be taken advantage of, so that the animal will be forced to pass at a fixed distance from the camera, as will be the case where the shore is narrowed by driftwood, rocks, or mud-holes.

Quite often temporarily erected obstructions will accomplish the same purpose, provided no scent is left and the material used is in harmony with the surroundings. Otherwise, in order to avoid having the camera sprung at a point where it is not in focus, the string can be run along the ground and then raised a foot or two high by forked sticks at the spot where the animal is most likely to pass.

Usually I have encamped near enough to hear the report of the flashlight employed, but sometimes the camera may be set many miles away, or perhaps I am in town or on a side trip, in which case it has not been unusual for the camera to remain unvisited for a week or ten days. But this is of little consequence; for, with the shutter opening and closing automatically, the exposed plate is safe until called for.

NESTING BIRDS EASY SUBJECTS FOR BEGINNERS

The alphabet for the beginner in wild-life photography usually comprises nesting birds of the neighborhood, Chipmunks, the lazy and sun-loving Woodchuck, or the stolid Porcupine, and even then many difficulties confront the novice, the overcoming of which opens the door for picturing rarer or more active subjects.

Some who take up camera hunting become discouraged by early failures and are unable to see how such as instrument can ever be a satisfactory substitute for the sportsman's gun. Others, with their interest only intensified by defeat, continue on until won over by the attractiveness of a contest where success costs no life or an awkwardly handled camera

leaves no wounded animal to die a lingering death.

Most birds are photographed about their nests, or in the great rookeries and breeding resorts of the seacoast and inland waters, when the domestic duties of the parents or when the fearlessness manifested by many birds under colonization make such photography pleasant and generally successful.

But there are times of the year and localities, as well as different birds, where an approach is difficult. Often a good method of getting birds singly or in flocks is the set camera.

Some years ago I tried to get a group picture of comparatively tame Buzzards and Vultures which daily circled about my southern cottage; but even when I was in a well-concealed retreat these keen-eyed birds knew of my presence and would not alight in the vicinity of the bait. After an hour's wait I set out a smaller camera, covered with palmetto leaves, within ten feet of the meat, and, tying a piece of this to a string, I withdrew. Returning in half an hour, the bait was all gone and the pulling string in a hopeless tangle. The group obtained included both the Black Vulture and the Turkey Buzzard (see page 109).

BUZZARD FIRING FLASHLIGHT IN DAYTIME

The left wing became involved in the string tied to the bait and half of the pinion feathers were pulled out. These birds became such a nuisance that when meat bait was used the flash was not set until dusk.

MOUSETRAP WILL SERVE AS A TRIGGER

Almost any bird of prey, like the Hawk, Owl, Eagle, or Condor, will pull energetically on the string; but in the case of smaller or more timid birds it is advisable to use an auxiliary spring trigger, or even a common mousetrap will do, since the release of the wire collar to which the string may be attached only requires the slightest pressure.

Having for several seasons scattered grain about an orange grove in Florida to attract local birds more regularly, I took a few of their pictures with the automatic camera, the focal plane shutter being set at 1–400 of a second. For the Quail and Ground Doves I used grains of wheat and sunflower seed strung on a thread (see page 107).

Pictures of birds nesting on sea beaches, in open marshes, or the tundra, where the use of a blind is difficult, may be obtained by concealing the camera in rocks, seaweed, or marsh vegetation. By stretching a thread taut across the nest the brooding bird on reëntering will release the shutter. In this way I secured a series of Snipe pictures, otherwise unobtainable, on the eastern shore of Virginia.

It is usually best to make the screen for the camera a day in advance, so as not to imperil the fertility of the eggs or the life of very young birds, for strong sunlight and chilling wind are equally fatal.

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WILD DUCKS ON THE WING: ONE OF THE MOST REMARKABLE BIRD PICTURES EVER MADE

The photograph was taken at Lake Merritt, Oakland, California, where, safe from hunters' guns, the wild Ducks are fed twice a day. They are leaving the feeding-grounds, and are seen in all conceivable positions. The picture emphasizes the fidelity with which Japanese artists paint birds in flight.

AMERICAN GAME BIRDS

Nature Has Stocked Our Continent with 200 Kinds of Flyers Which Take Front Rank as Food and in the Eyes of Sportsmen

By Henry W. Henshaw

With Illustrations in Color from Paintings by Louis Agassiz Fuertes

FROM the time of the earliest settlement of our country the wild game of America has proved a national asset of extraordinary value. Nowhere in the world, except in Africa, was there ever greater abundance and variety of wild life.

The forests of America were filled with game birds and animals, large and small; its streams, lakes, and ponds were covered with waterfowl, and its rivers and shores furnished highways for myriad shore birds as they passed north and south.

Nature would appear to have stocked this continent with lavish hand. Indeed, but for the wild game our predecessors, the Indians, would not have been able to maintain existence, much less to advance as far as they did in the arts that lift peoples toward the plane of civilization.

And at first our own forbears were scarcely less dependent than the aborigines upon game for food. Many years of toil and struggle had to pass before the rude husbandry of the colonists sufficed to free them measurably from dependence on venison and wild fowl.

HUNTERS AND TRAPPERS PUSHED OUR FRONTIERS WESTWARD

Nor will any student of American history doubt that, but for the services of our pioneer hunters and trappers who literally hunted and trapped their way from the Atlantic to the Pacific, the course of empire westward would have been halted for decades. As a consequence, the settlement of much of our fair land would have been long delayed, if, indeed, the land had not passed into the possession of other peoples.

Moreover, it was in the pursuit of game that the hardy frontiersmen developed skill as marksmen and acquired many of the rude border accomplishments which later made them effective soldiers in the war for independence.

Game existed everywhere, for the Indian, though wasteful of wild life and knowing naught of game laws, took what toll he would of the game about him, and yet made no apparent impression on its quantity; so that it passed into the hands of his successors, along with his lands, practically in its original state.

AMERICAN WATERFOWL AND SHORE BIRDS

And what a rich heritage it was! In addition to the upland game birds of the forests and open glades, great numbers of Ducks and shore birds found on our Western prairies and in the innumerable lakes and ponds the food, solitude, and safety necessary during the nesting period. More important still as a nursery for wild fowl and shore birds were, and still are, the tundras of Alaska and the barren grounds that, dotted with countless lakes and rivers, stretch to the Arctic.

Here, in these northern wilds, solitude reigns supreme, and vast multitudes of waterfowl breed, assured of both food and safety. On these Arctic plains Nature has provided in a remarkable way for her winged servants by supplying an inexhaustible crop of berries. As the short summer season wanes the berries ripen and furnish a nutritious food upon which the waterfowl fatten and gain strength for their long southern journey.

Then the Ice King takes the remainder of the crop in charge, wraps it in a mantle of snow and ice, and keeps it safe in Nature's cold storage, ready for delivery in spring to the hungry migrants. Without this storehouse of berries it is doubtful if our waterfowl could sustain life in

Photograph by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

ONE OF THE LAST OF HIS RACE

The occupation of its breeding grounds by man and increase of hunters has almost caused the Trumpeter Swan to join the Passenger Pigeon in oblivion. A male bird of this rare species (see illustration in color, page 146, and text, page 175) visited the Louisiana State Game Preserve several winters ago and it is hoped this sanctuary will attract others.

the Arctic, and the so-called barrens, instead of being a nursery for myriad fowl, would indeed be barren so far as bird life is concerned.

When the short Arctic summer closes and the young birds acquire strength for the journey, multitudes of Ducks, Geese, Swans, and shore birds, anticipating the Arctic winter, wing their way to southern lands.

Including these winged hordes from the Arctic that visit our territory and the birds that nest within our own limits, America possesses upward of 200 kinds of game birds, large and small, many of which are in the front rank, whether viewed merely from the economic standpoint as food or through the eyes of the sportsman.

FLOCKS OF PIGEONS ONCE ESTIMATED AT TWO BILLION BIRDS

While the aggregate numbers of game birds are very great, they sink into insignificance when compared with their former abundance. The statements of the early chroniclers regarding the multitudes of Ducks, Plover, and Wild Pigeons almost defy belief. When, in the records of the first part of the last century, one reads of clouds of Pigeons that required three days to pass a given point in a continuous moving stream, and again of flocks estimated to contain more than two billion birds, credulity is taxed to the limit.

Not only one such flock was observed; they were of periodic occurrence during many years of our early history, and the accounts of them are too well attested to be doubted. As a curious sidelight on the abundance of wild fowl and the hardships to which the slaves of the period were subjected, Grinnell states that "In early days slave owners who hired out their slaves stipulated in the contract that Canvasback Ducks should not be fed to them more than twice each week"!

What, then, has become of the teeming millions that once possessed the land? Before attempting to answer this question it may be well briefly to review certain general causes that contribute to the depletion of the ranks of game birds. Among these may be mentioned natural diseases; natural enemies, both winged and four-footed; forest, brush, and prairie fires; the drainage of swamps and the general elimination of nesting grounds by the advance of agriculture; and finally, most potent of all, the agencies of destruction—firearms.

From the nature of things, no data are available to show exactly the relative importance of the above causes of decrease or of their separate or combined effect. Nevertheless we can arrive at an approximate idea of their relative effect.

Natural diseases seem to play a comparatively unimportant part in causing the death of birds, except perhaps indirectly. In a state of undisturbed nature there are few sick or old birds, for the reason that the sick, the heedless, and the old, as soon as their strength begins to fail, are promptly eliminated by natural enemies, who, while foes of individual bird life, nevertheless do good service to the species in keeping the vigor of the stock at a high standard by promptly weeding out the unfit.

While the annual loss of game birds by attacks of predatory birds and mammals is no doubt very great, it is to be noted that it is relatively far less at the present time than formerly, owing to the general destruction of birds of prey and of wild four-footed animals of whatever name or nature.

CATS ARE DESTROYERS OF BIRD LIFE

The contrary is true of that predatory animal, the house cat. Never were house cats more destructive of bird life than now. While the annual loss of insectivorous birds by them is far greater than that of game birds, the loss of Woodcock, Quail, Grouse, and upland-breeding shore birds is by no means small. Taking into account bird life in general, the cat is undoubtedly the most destructive mammal we have, and the aggregate number of birds annually killed by them in the United States is enormous.

Of late years serious losses have been reported among the Ducks of certain localities in the West. The causes are yet obscure, but they are probably not due to epidemics, as commonly believed. They will probably prove to be very local and of comparatively modern origin, and to be dependent on drainage contaminations or unnatural crowding into unfavorable feeding grounds. It is hence

Photographs by George Shiras, 3rd

ONE OF NATURE'S HYDROPLANES

Two striking pictures showing the rising flight of a Pelican. In the upper illustration the wings are seen at different angles; the lower picture shows the wings outspread, and the resemblance to a Canada Goose is marked (see illustration in color, page 146).

highly probable that such losses can be eliminated either in whole or in part.

Before the coming of the whites, forest and prairie fires were due to lightning or were purposely set by the Indians to facilitate the pursuit of large game. While they were no doubt common at certain seasons and probably fatal to many birds, they were too insignificant to have played an important part in the reduction of numbers.

FIREARMS THE CHIEF CAUSE OF DECREASE

The destruction of former breeding grounds, through drainage and the general advance of agriculture, is a very important cause of the diminution of certain species. But while agriculture usurps the breeding grounds of many species, especially Ducks and Geese, its effect in this direction is to some extent lessened, since it prepares the way for other species, like the upland game birds, and furnishes food and breeding grounds for them.

While these and other causes that might be enumerated have tended to diminish the numbers of game birds, even taken collectively they have played only a minor part in the great reduction of these birds as a whole.

It is the gun that has been the chief cause of the destruction of our game, large and small. Whatever weight may be attached to other causes, these fade into insignificance when compared with the effect of firearms.

It is nothing short of marvelous how little time was required by the early pioneers, even with the crude firearms of the time, to make an impression on the abundance of American game. What the Indian with his bow and arrow and his rude nets failed to do in thousands of years, the handful of white men with powder and shot accomplished in a few decades.

Writing within 40 years after the first settlement in New England, Josselyn states that already the Wild Pigeon had diminished greatly, "the English taking them with nets"; and he adds that the English and Indians, who by this time were supplied with guns, had "destroyed the breed of Wild Turkeys, so that even at that early day it was very rare to meet one in the woods."

Thus two of our most important game birds, in less than half a century after the first settlements, had already begun to disappear from the neighborhood of the New England colonies. Nor is there reason to believe that it was different in other parts of the country. Game abounded, was needed for food, the supply seemed inexhaustible, and it was shot regardless of consequences, and at first, no doubt, without thought of depletion.

It is undoubtedly true that up to the present time far more strenuous efforts have been made in this country to destroy game than to preserve it. Even to-day a vastly greater number of individuals are interested in game as something to kill than as something which deserves protection. Clubs having for their chief object the pursuit of game of all kinds have existed since early days; but organizations having for their chief object the preservation of game are relatively few in number and of comparatively recent origin.

AMERICA HAS BEEN A PARADISE FOR SPORTSMEN

America has always been a paradise for sportsmen, but of late years the number of those whose chief relaxation is the pursuit of game has greatly increased, and to-day there are probably not far from seven millions who are interested in the pursuit of game!

The enormous number of men in a single State who hunt appears from such records as those of the Game Commission of Pennsylvania, which show that in 1926 more than 525,000 hunters' licenses were issued by that commonwealth.

As the landowner with his tenants and their families may hunt under the provisions of the law without paying a license, and as there are many who hunt in violation of the law, it is believed that fully 100,000 more men hunt in that State during the open season than are licensed.

Large as the figures seem, and they are the largest for any State in the Union, it should be remembered that they represent less than 10 per cent of the total population of Pennsylvania, while in the Northwest, notably in Idaho and Montana, more than 10 per cent of all the people are licensed hunters.

What this army of six or seven million hunters means to the large and small

Photograph by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

WILD GEESE OVER MARSH ISLAND, LOUISIANA

Five varieties of Geese seek the succulent grasses of this sanctuary, which is a gift to birds from Mrs. Russell Sage.

game of America can better be imagined than described. Modern guns and ammunition are of the very best, and they are sold at prices so low as to be within the reach of all. Added to these very efficient weapons for killing small game, are combined the general use of automobiles, power boats, and the development of airplanes to give easy access to formerly remote and difficult haunts of game.

Some of the most unfair and destructive devices for facilitating the killing of game have been made illegal, but are still used on a small scale in out-of-the-way places where detection is difficult owing to local sentiment in favor of the offenders. These evasions of the law are of little importance, however, in their effect on the abundance of game compared with the effect due to the extension of roads and the great increase in the use of automobiles and motor boats. These have almost abolished wilderness areas and only by increasingly stringent protective measures and the wide-spread increase of game reservations may we hope to maintain wild things in the face of our increasing population.

MONEY VALUE OF GAME BIRDS

Passing by for the moment all esthetic considerations, the money value of the vast number of game birds that breed within the several States or visit them in migration is so great as alone to entitle the birds to careful protection. This point of view is being taken by several States. Thus Oregon values her game resources, which consist in no small part of game birds, at $5,000,000 annually, while Maine and California, respectively, claim their game to be worth $20,000,000 annually.

To permit the extermination of any part of this valuable food asset, valuable alike to State and Nation, by continuing the wasteful methods of the past is an economic crime against present and future generations. And here it is important to point out that while the majority of our Ducks, Geese, and Swans breed outside our jurisdiction, they winter within our own borders. Failure adequately to protect them, therefore, in their winter quarters means their ultimate extinction.

Intimately connected with the problem of conserving our wild game was, until very recently, the killing of game for market. Many of those who studied the subject earnestly did not hestitate to express the conviction that under the conditions which prevailed in the United States a short time ago the conservation of our Ducks, Geese, and shore birds was impossible if their sale in open market continued.

Under the Federal Migratory Bird Treaty Act of 1918 the sale of all migratory birds is now prohibited throughout the United States; likewise, the sale of most resident game, except rabbits, is prohibited by State laws.

STATE PROTECTIVE LAWS

State or colonial ownership of game was indeed early recognized, but only grudgingly in so far as it was restrictive of the right of the individual to hunt wild game when and where he pleased. Everywhere the feeling prevailed that all wild game belonged to the people, to be killed whenever necessity or inclination prompted, and it may be said that no little of this feeling remains to the present day.

The change from the old belief that wild game belonged to him who could take it, to the theory of State ownership of game, marked a long step forward in game preservation. To-day few principles of American law are more firmly established than this, though it was not until 1896 that the principle was formally enunciated by the Supreme Court of the United States.

If the several States, under the principle of State ownership, have failed adequately to protect their game, it has not been for lack of game legislation. Even in the colonial period laws regulating the manner of taking game were passed. As early as 1708 Heath Hens, Ruffed Grouse, Quail, and Wild Turkeys were protected in New York; but it was not till 1791 that Woodcock were given legal protection. In 1710 a law was enacted in Massachusetts prohibiting the use of boats and canoes with sails, or canoes disguised with hay, sedge, or seaweed, for hunting waterfowl.

Snipe were protected in Massachusetts in 1818, and Ducks in Rhode Island in 1846; Connecticut and New Jersey pro-

tected their Doves and insectivorous birds in 1850, and in 1851 Wisconsin passed protective laws in favor of the Prairie Chicken. It is worth noting in connection with game legislation that it was not until 1878 that the first bag-limit law was enacted. This limited the bag of game birds in Iowa to 25 in one day—a limit which remained practically unchanged for 37 years.

Since early times, and especially of late years, game legislation has so flooded the country that it is difficult to keep track of it. More than 1,300 laws were enacted during the first decade of the present century (1901-1910). Despite this great volume of legislation, some birds, such as Geese, were not given a closed season in California, Texas, Arkansas, and other States until the passage of the Migratory Bird Treaty Act in 1918.

STATE GAME LAWS DIVERGENT

It needs only a glance to show that State laws and regulations affecting game differ widely, even in adjoining States; thus a game bird may be adequately protected by law in one State and be only partially protected in a neighboring State, or not protected at all.

Moreover, the history of game preservation since colonial times in many States reveals no well-defined policy, but a series of regulations constantly changing according to the ever-shifting points of view of State and game officials and the political exigencies of the moment. Even the funds raised by the sale of hunting licenses, in most States ample for effective enforcement of the laws, have not always been devoted to the cause of protection, but often have been diverted to very different uses.

So great is the divergence in the nature and purpose of game legislation of the several States that there would seem to be little hope that the inconsistencies and shortcomings will ever be reconciled. Some who do not realize what has been accomplished in recent years are inclined to despair.

Meantime, after a century of experiment by the States, the depletion of our game birds continued, and the end of several species was in plain view. It was evident, so far as the conservation of wild life was concerned, that State control had proved a failure. Rarely has a State succeeded in adequately protecting its own resident game, to say nothing of the game that migrates through it.

FEDERAL MIGRATORY BIRD LAW

It is the belief of many that what the States failed to do for the conservation of our migratory bird life can be accomplished by the Federal Government, and they further believe that the act approved March 4, 1913, commonly known as the Federal Migratory Bird Law, marked a long step in advance in game protection. By this act the migratory game and insectivorous birds which do not remain permanently within the borders of any one State or Territory are declared to be within the custody and under the protection of the Government of the United States.

This act, be it noted, provides protection only for game and insectivorous birds that migrate; hence many of our finest game birds, like the Bobwhite, Valley Quail, Mountain Quail, Ruffed Grouse, Prairie Hen, Sage Hen, Blue Grouse, Wild Turkey, and others, being nonmigratory, have been left in charge of the several States in which they reside. Here we may leave them, trusting that, notwithstanding past failures, the measures enacted for their benefit will stay the fate with which most of them are threatened.

Migratory birds are on a very different basis from others. Such of the Ducks, Geese, and shore birds as still breed within our limits, including Alaska, migrate early to more southerly localities, where they winter. Some of them, in fact, especially the shore birds, pass beyond our borders and winter south of the Tropics. The great majority, however, breed in foreign territory far to the northward of our possessions, and we have no claim on them save as they tarry on their journey for a time along our coasts or on our lakes and rivers or winter in the Southern States.

It seems eminently fitting that these migrants, as they traverse our territory, feeding in one State to-day, in another State to-morrow, should be under Federal control, subject to such regulations as seem likely to preserve the species.

The law giving Federal protection has met with general approval. Moreover, its main purposes have been indorsed by the

Photograph by William L. Finley and H. T. Bohlman

CALIFORNIA CONDOR ALIGHTING ON THE MOUNTAIN SIDE

The Condor is the largest bird that flies and also one of the rarest. He weighs from 20 to 25 pounds and has a wing spread of 9 or 10 feet. When under sail, a bird of this size always has difficulty in making a safe landing.

Photograph by William L. Finley and H. T. Bohlman

A WEDGE OF WHITE PELICANS

No ship will ever sail the skies with the grace and beauty of a White Pelican. While ungainly in appearance when on the ground, a flock of these birds winding slowly among the clouds is a sublime sight. The wings, partly black in color, make a showy contrast with the white of the body.

"THE BENEDICTION"

Photograph by William L. Finley and H. T. Bohlman

A parent bird is seen alighting in a colony of half-grown young White Pelicans crowded together like children in a day nursery. As a rule, there are two young in each family.

Photograph by William L. Finley and H. T. Bohlman

GREAT BLUE HERON ON GUARD BY HIS NEST

This bird is sometimes erroneously called "Crane." He has long legs for wading after fish and frogs, is about four feet high and, if he were subject to human ailments, would have about 12 inches of sore throat (see illustration in color, page 51).

Photograph by William L. Finley and H. T. Bohlman

GULLS ON AN ANCHOR CHAIN

These birds are at home along the waterfronts of our seacoast cities, where they live during the fall and winter, picking up waste scraps of food. In summer they nest in colonies on the islands of inland lakes or on the sea rocks off the coast.

Photograph by William L. Finley and H. T. Bohlman

A DANGEROUS CLIMB AFTER SEA BIRDS

California Murres live on the inaccessible ledges of the sea cliffs. Through the efforts of the National Association of Audubon Societies, these rocks off the Oregon coast were set aside as a Federal reservation for sea fowl in 1907.

Photograph by William L. Finley and H. T. Bohlman

A YOUNG AVOCET AT HOME IN THE MARSH

The Avocet is a resident of the great marsh areas of the West. His skirts are cut short for wading and he moves along in the water, swinging his bill from side to side, hunting for small water life (see illustration in color, page 150, and text, page 171).

Photograph by William L. Finley and H. T. Bohlman

A GOOD WING-SHOT OF A FEMALE PINTAIL DUCK

Shooting with a shutter is many times more difficult than shooting with a gun. The camera was hidden in a blind and the photographers waited all day before getting this picture.

Photograph by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

PINTAILS IN FLIGHT OVER ONE OF THE LOUISIANA GAME PRESERVES, WHICH OFFER SANCTUARY TO MILLIONS OF MIGRATORY WATERFOWL EVERY WINTER

Photograph by William L. and Irene Finley

A COVETED PLACE ON THE BOWSPRIT

Gulls live about a ship almost as a Robin does in a garden. They will coast along at the stern of a steamer for days to get a meal of choice "seconds" thrown out by the cook. There seem to be reliable records of Gulls following the same vessel from the Irish coast to New York, a distance of 2,560 miles.

great majority of sportsmen, though among them are many who dissent from certain regulations because they abridge the privileges enjoyed under State law.

In this connection it may not be out of place to direct the attention of sportsmen, many of whom seem to have somewhat misconstrued the purpose of the Federal law, to the fact that the intent of the law was not primarily to increase shooters' privileges by lengthening the open season and enabling them to kill larger bags of game, but to preserve game birds in general, more particularly the ones threatened with extinction.

SPORTSMEN AS CONSERVATORS OF GAME

If the accomplishment of this laudable end curtails to some extent the present privileges of sportsmen, they should not complain, since the ultimate result of the law, if it be enforced, will be largely to increase the number of our game birds. Should it thus somewhat curtail the privileges of the present generation of sportsmen, it will at least insure to future generations the perpetuity of our game birds.

There are many good citizens in the United States who believe that hunting is wrong and who consider all sportsmen archenemies of wild life. There are sportsmen and sportsmen, and the genuine lover of gun and dog will almost invariably be found to be a lover of Nature and at heart a conservationist of wild life.

Be the sportsman what he may, the sportsmen of the United States, as a body, constitute a very important factor in the present struggle to keep wild creatures from total extinction. Many of us who love wild life and who long ago abandoned the use of the gun, nevertheless believe that game exists for reasons other than esthetic. Only extremists insist that all animal life is sacred and must on no account be taken. Birds, in addition to their esthetic value and their importance as allies of the farmer in his warfare on insects, are important as food.

BOTH FEDERAL AND STATE LAWS NECESSARY

They are also important because they furnish a healthful and exhilarating pursuit to an army of men who at certain seasons take to the woods and fields and because of their outdoor life make better men and better citizens.

Since game birds have such strong claims on our interests, it cannot be doubted that both State and Federal laws are necessary for their protection, and the more cordial and complete the cooperation between State and Federal officers, the more effective will be the administration of the laws. Even more essential in the long run is the recognition of the importance of our wild life by the people at large and their hearty sympathy and active coöperation as individuals with efforts for its protection.

Nor should sportsmen and sportsmen's clubs be backward in cordial coöperation, since they are among the chief beneficiaries of measures for the preservation and increase of game birds. The need is not for more laws, but rather for fewer, simpler, and more comprehensive statutes. It is the multiplicity of legal enactments subject to constant change, coupled with their nonenforcement, that has been largely responsible in the past for the general decline in the number of our game birds. Fewer laws with better enforcement should be the rule for the future.

THE PRESERVATION AND INCREASE OF GAME BIRDS ARE FEASIBLE

A few words may be added on certain practical means, other than restrictive measures, for the preservation and increase of our game birds. One of the most effective is the establishment of sanctuaries where birds may safely resort to nest or to feed during migration.

The Federal Government has already demonstrated the utility of this method and has established no fewer than 74 bird reservations in different parts of the United States, including Alaska. If the national parks, large game preserves, and national monuments are added to the list, the Government now has more than 100 sanctuaries, some of which include thousands of acres, where birds of all kinds are protected at all seasons.

The example thus set by the Government has stimulated both State authorities and private individuals. Several of the States now have extensive game preserves or refuges of their own, and a

large number of private sanctuaries have been set apart, aggregating many square miles in extent.

Conspicuous examples of these are the great areas of marsh dedicated to wild-life conservation such as Marsh Island, acquired through the generosity of Mrs. Russell Sage; the Paul J. Rainey Wild-life Sanctuary, recently donated to the National Association of Audubon Societies by Mrs. Grace Rainey Rogers, Mr. Rainey's sister; and the Rockefeller preserve. All these are in Louisiana. That private means are being thus devoted to the public welfare through the protection of birds speaks well for the future.

VALUE OF BERRY-BEARING SHRUBS

It is gratifying to note that an increasingly active interest in wild-life reservations is developing in the States. Laws are being enacted and even bond issues proposed for the establishment of State systems of reservations where shooting will be prohibited, as it is in the greater part of the District of Columbia. Such tracts, especially if public parks, not only serve the important end of conserving bird life, but possess added value to the public as pleasure resorts. They serve also the cause of education by providing readily accessible places where the habits of wild life may be studied by school children and others.

Another important way of caring for both game and insectivorous birds is to provide food for them, especially in winter and during deep snows. This method is particularly effective, since the expense entailed is small and it can be practiced everywhere by private individuals. Pittsburgh has a special superintendent whose peculiar care is the birds in the public parks. Several States have State ornithologists, whose duties include the study of the habits of birds from the economic point of view, and the preparation of reports to aid in the framing of protective legislation.

The planting of berry-bearing shrubs and trees in public parks and along public roadsides is another effective method of caring for our bird life.

Such organizations as the Meriden Bird Club, of New Hampshire, are especially to be commended. This is a local community club as distinguished from the public or private preserve or sanctuary. Its purposes, as stated in its constitution, are as admirable as they are direct and simple: "The objects of this club shall be the increase and protection of our local wild birds, the stimulation of interest in bird life, and the gradual establishment of a model bird sanctuary."

Of wider scope and aims are such organizations as the Boone and Crockett Club, National Association of Audubon Societies, with its many affiliated State societies; the American Game Protective Association; and the State game protective associations. The work of these various bodies, individually and collectively, has proved a most important factor in the nation-wide movement to conserve our valuable bird life.

Of recent years instruction as to the economic value of birds and the best ways to conserve them has received much attention in the public schools of many States, and the results are likely to prove fruitful, both now and in the years to come.

MANY GAME BIRDS CAN BE REARED IN CAPTIVITY

Finally, the artificial propagation of our game birds has a direct and important bearing on their present and future welfare. It has already been demonstrated that Bobwhite and other Quail can be reared in captivity and used to stock depleted covers, while Canada Geese, Mallards, Black Ducks, Wood Ducks, and others of the Goose and Duck tribe can be reared under suitable conditions almost as readily as domestic fowls and be used to stock public lakes and ponds. This is a work which may properly be undertaken by State game commissions and is being done by some States.

If in consequence of the cessation of spring shooting the numbers of our waterfowl and shore birds are maintained, as is confidently expected they will be, the sale of hunting licenses in most of the States should provide ample funds for all necessary experiments in the artificial propagation of game on a large scale, and thus be an important factor not only in preserving the species now in danger, but in furnishing game for sport and food.

Photograph by Stanley Clisby Arthur. Courtesy of the Conservation Commission of Louisiana

MALLARDS "TIPPING UP" ON THE LOUISIANA STATE GAME PRESERVE

The water bottoms of the lowlands grow Duck food in abundance (see text on the Mallard, page 134, and illustration in color, page 135).

AMERICAN MERGANSER (Mergus merganser americanus)

Range: Breeds from southern Alaska, southern Yukon, central Keewatin, and Newfoundland south to central Oregon, southern South Dakota, southern Minnesota, central Michigan, northern New York and northern New England and in the western mountains south to California, Arizona, and New Mexico; winters from Aleutian Islands, British Columbia, Idaho, northern Colorado, southern Wisconsin, southern Ontario, northern New England, and New Brunswick south to Lower California, northern Mexico, Texas, Louisiana, Florida, and the Bermudas.

Characteristics: The narrow, serrated bill of the Goosander, as contrasted with the broad, smooth bills of most Ducks, would suggest to the merest tyro that its habits must differ widely from those of most of its kin. In fact, the Goosander's bill, with its sawlike teeth, is specially adapted to seizing and holding slippery prey of various kinds, including small fish which, though not its sole food, constitute the most important part of it. Water insects, frogs, and crawfish are by no means disdained.

The Goosander's long, narrow body eminently fits it for swift progress under water, where it spends much of its time. Cold weather and ice have no terrors for it, and the bird may winter wherever open water is assured, provided only that food is abundant. Not many Goosanders remain within our territory to breed, and these retire to foaming mountain torrents.

The Merganser nests on the ground, also in hollows of trees. The bird has learned to care for its safety, and is holding its own very well.

MALLARD (Anas platyrhyncha)

Range: Breeds from Pribilof Islands, northwestern Alaska, northern Mackenzie, central Keewatin, and Greenland south to Lower California, southern New Mexico, southern Kansas, central Missouri, and southern Indiana; winters from Aleutian Islands, central Alaska, central Montana, Nebraska, southern Wisconsin, northern Indiana, Ohio, Maryland, south to Mexico, the Lesser Antilles, and Panama.

Characteristics: This fine Duck is monopolized by no one country nor even continent, but includes in its range both hemispheres. Its size, abundance, and excellent flavor make it perhaps the most important of its family, and its value to mankind is still further enhanced by the fact that it lends itself so readily to domestication that many of our domestic varieties are derived from it.

Before the settlement of the West the ponds and sloughs swarmed with Mallards, which nested there by thousands, and in fall and winter, as migrants and winter residents, covered the watercourses to the south. To-day there is a very different story to tell. Many of the Mallard's old breeding grounds are now farms, and the bird is represented by a few hundreds where once there were myriad.

The Mallard is a most omnivorous Duck, and nothing in the way of mast, grain, or small animal life comes amiss. In the Far West it has the habit, shared to the same extent by no other Duck, of resorting to the stubble for waste grain.

HOODED MERGANSER (Lophodytes cucullatus)

Range: Breeds from central British Columbia, Great Slave Lake, central Keewatin, central Ungava, and Newfoundland south to southern Oregon, northern New Mexico, southern Louisiana, and central Florida; winters from southern British Columbia, Utah, Colorado, Nebraska, Illinois, Indiana, Pennsylvania and Massachusetts south to Lower California, Mexico, the Gulf States, and Cuba.

Characteristics: This, the smallest and most beautiful of the Mergansers, formerly was abundant in the East, where it nested in many States, including New England. Of late years it has diminished greatly in numbers. Unlike its near relatives, it prefers still-water ponds and rivers, and is often found in company with the Wood Duck. Its flesh is said to have little of the unpalatable fishy flavor of its congeners, and this would seem to imply a more varied diet, including probably seeds and grasses. Nevertheless, Nature did not endow the Merganser with the serrated bill of its kind without a purpose, and its skill in diving and seizing its finny quarry proves that fish, or at least aquatic creatures of some sort, are its natural food.

The Hooded Merganser nests in hollow trees, sometimes thirty or more feet up, and the wonder is how the tiny Ducklings find their way to the nearest water, as they certainly do in a very few hours after emerging from the egg.

BLACK DUCK (Anas rubripes and subspecies)

Range: Breeds from central Keewatin and northern Ungava south to northern Wisconsin, northern Indiana, and southern Maryland; winters from Nova Scotia south to southern Louisiana and Colorado; ranges west in migration to Nebraska and central Kansas.

Characteristics: The Black Duck is essentially confined to the Eastern States, usually migrating no farther west than Kansas, and that rarely. It is a favorite object of pursuit by sportsmen, and in the struggle to maintain existence has learned its lesson so well that it is still comparatively numerous in localities where less wary species would long ago have been exterminated. Originally a diurnal-feeding species, like most Ducks, persecution has taught the Black Duck to seek safety on the broad ocean during the hours of daylight, and to resort to inland ponds for the purpose of feeding only after sunset. In order to protect this and other waterfowl one of the regulations under the Federal Migratory Bird Law forbids shooting after sunset and before sunrise, and the enforcement of this regulation will probably do more for the preservation of the Black Duck than any other provision that could be devised.

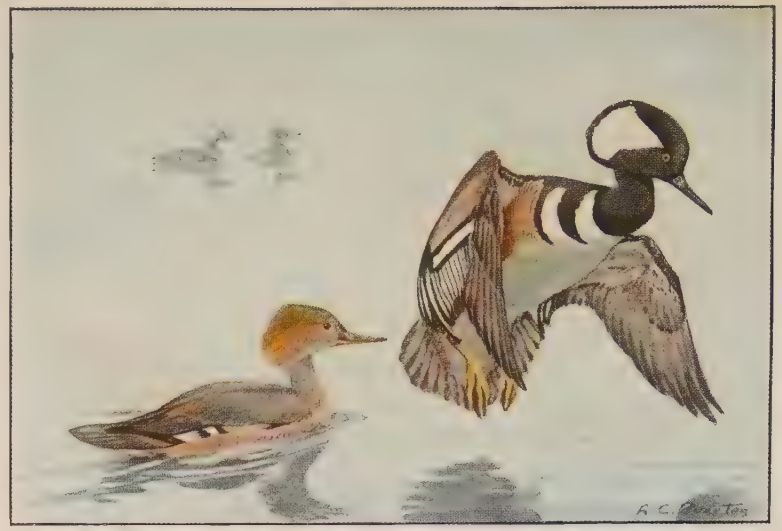
The Black Duck is excellent eating, and experiments prove that it can be reared in captivity.

The Florida Black Duck is a closely allied species, with similar habits, and is resident in Florida and along the Gulf coast.

RED-BREASTED MERGANSER (See page 174)

Male Female Male Female

AMERICAN MERGANSER RED-BREASTED MERGANSER



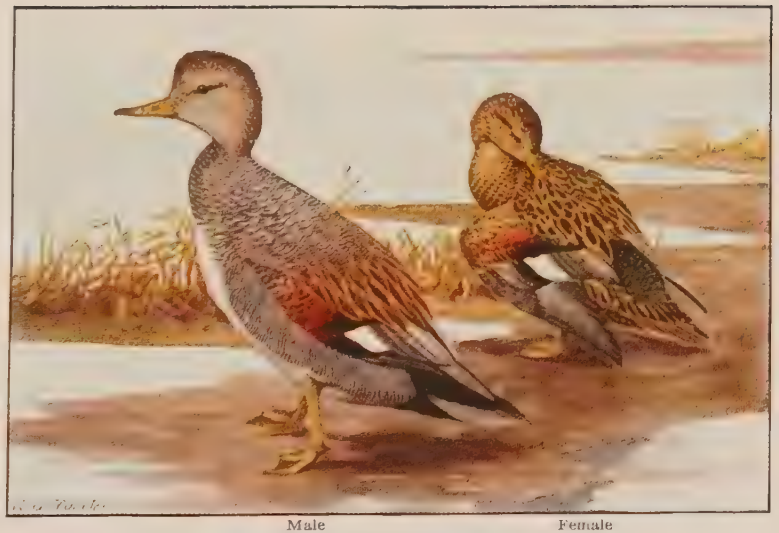
Female Male

HOODED MERGANSER

Male Female

MALLARD

BLACK DUCK



Male Female

GADWALL

Female Male

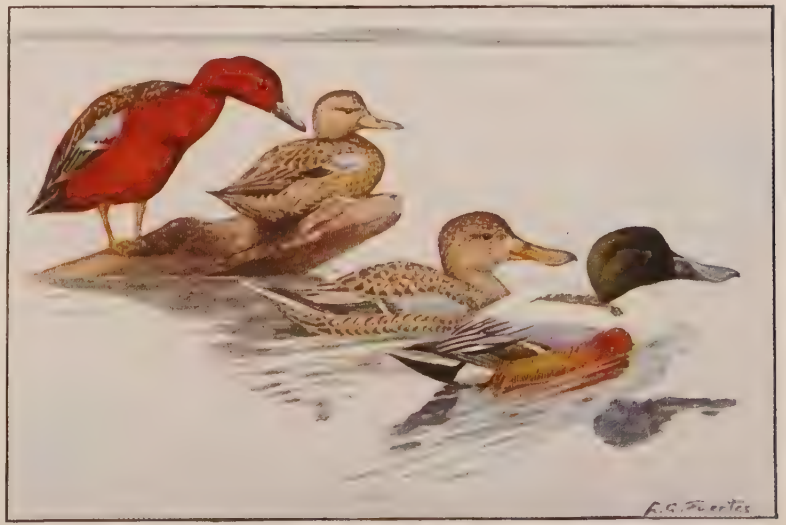
BALDPATE

Male

EUROPEAN WIDGEON

Male Female Male Female

GREEN-WINGED TEAL BLUE-WINGED TEAL



Male Female Female Male

CINNAMON TEAL SHOVELLER

GADWALL (Chaulelasmus streperus)

Range: Breeds from southern British Columbia, central Alberta, and central Keewatin south to southern California, southern Colorado, northern Nebraska, and southern Wisconsin; winters from southern British Columbia, Arizona, Arkansas, southern Illinois, and North Carolina south to southern Lower California, central Mexico (Jalisco), and Florida.

Characteristics: Though seemingly as well fitted for the struggle for existence as any of its fellows, the Gadwall apparently was never very abundant in any part of its range. Formerly it was not uncommon in New England and in the Middle and Eastern States, but it is now practically unknown to the sportsmen of the Atlantic seacoast, though still found in considerable numbers in Texas, and other Western States. I have never seen the Gadwall in large flocks, but usually singly or by twos or threes in company with Ducks of other species.

It is a denizen of fresh water and is fond of shallow lakes and ponds, where its habits somewhat resemble those of the Mallard. It is a good diver when the need arises, but usually finds little occasion for the exercise of its skill, since it frequents the shallow margins of ponds and lakes in company with Mallards and other species. I have frequently seen the Gadwall literally stand on its head in shallow water grubbing for food on the muddy bottom, when only its feet and the tip of its tail were sticking out. Its bill of fare includes aquatic grasses, seeds, nuts, insects, mollusks—in short, almost any edible substance it can obtain.

GREEN-WINGED TEAL (Nettion carolinense)

Range: Breeds from Pribilof Islands, northwestern Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to central California, northern New Mexico, northern Nebraska, northern Illinois, southern Ontario, Quebec, and New Brunswick; winters from Pribilof Islands, British Columbia, Nevada, southern Nebraska, northern Indiana, western New York, and Rhode Island south to southern Lower California, the West Indies, and Honduras.

Characteristics: The Green-wing has managed to hold its numbers remarkably well considering the ease with which it may be decoyed. It is one of our most beautiful and attractive waterfowl. Its slender graceful lines, swift flight, and attractive ways give it a strong individuality. The Green-wing does not frequent large lakes and open water, but shows a marked preference for fresh-water marshes and grass-fringed ditches. It is remarkable in how small a waterway a flock will hide and if undisturbed feed contentedly for hours. Few Ducks decoy better, and when a number of the flock are stretched on the water, the survivors will once and again return to their comrades as if totally unable to grasp the situation or to realize the necessity of saving their own lives by flight. This Teal is not much of a diver, for it usually feeds in shallows. Many will attest to the excellence of roast Teal, but few will agree with Audubon that it is superior to the Canvasback.

BALDPATE (Mareca americana)

Range: Breeds from northwestern Alaska, northern Mackenzie, and central Keewatin south to Oregon, Nevada, Utah, Colorado, Kansas, southern Wisconsin, and northern Indiana; winters from southern British Columbia, Arizona, southern Illinois, Maryland, and Delaware south to southern Lower California, the West Indies, and Costa Rica.

Characteristics: The beautiful Baldpate is widespread over the fresh-water lakes and ponds of the United States from ocean to ocean. Formerly this bird nested in great numbers in the Western States, but of recent years its nesting grounds have been greatly restricted, and now most of the Ducks that visit the United States come from farther north. At one time, through market hunting and spring shooting, the Baldpate became so reduced in numbers as to jeopardize its future. The protection extended to it and its kind by the Migratory Bird Treaty has restored its numbers so it is again fairly numerous in most of its former haunts. When disturbed in ponds near the coast it has learned to find safety on the ocean. It has become one of the wariest of Ducks and, like the Black Duck, has, in many localities, become a night feeder, devoting the hours of daylight to safeguarding its life by incessant watchfulness. Like most other Ducks, the Baldpate is fond of wild celery, but as its skill as a diver is small, it essays the rôle of highwayman, and when the Canvasback or Redhead appears on the surface with a bill full of the coveted grass, the fruit of honest toil, it snatches the booty.

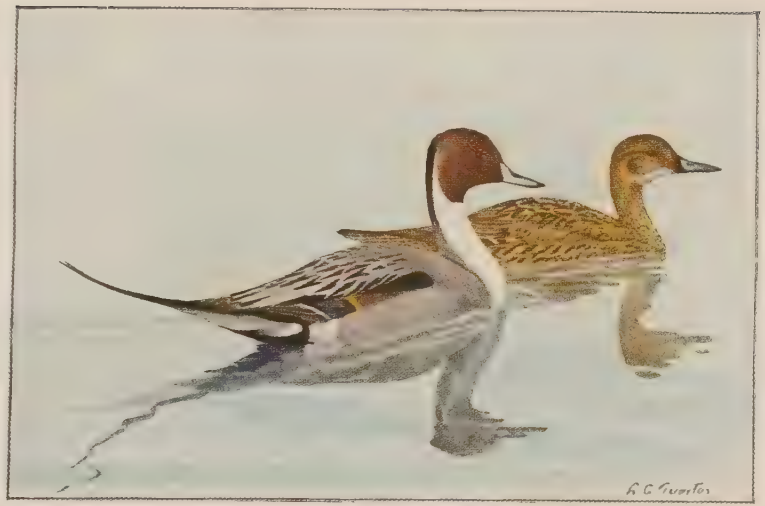
SHOVELER (Spatula clypeata)

Range: Breeds from northwestern Alaska, northwestern Mackenzie, and southern Keewatin south to southern California, central New Mexico, northern Texas, northern Missouri, and northern Indiana; winters from southern British Columbia, Arizona, New Mexico, southern Missouri, southern Illinois, Maryland, and Delaware south to West Indies and Columbia.

Characteristics: The Shoveler is cosmopolitan in its range and, while no longer common in the Eastern States, it is still numerous in several States of the Far West where it breeds. The Shoveler likes reedy ponds and sloughs, where it grubs in the shallows, and obtains a rich feast of insects, tadpoles, worms, and larvæ of various kinds, which its shovel-shaped bill seems expressly designed to enable it to scoop up and strain out of the ooze. By many it is accounted one of our best table Ducks. As it is not shy and is often killed in large numbers, it has suffered a woeful decrease.

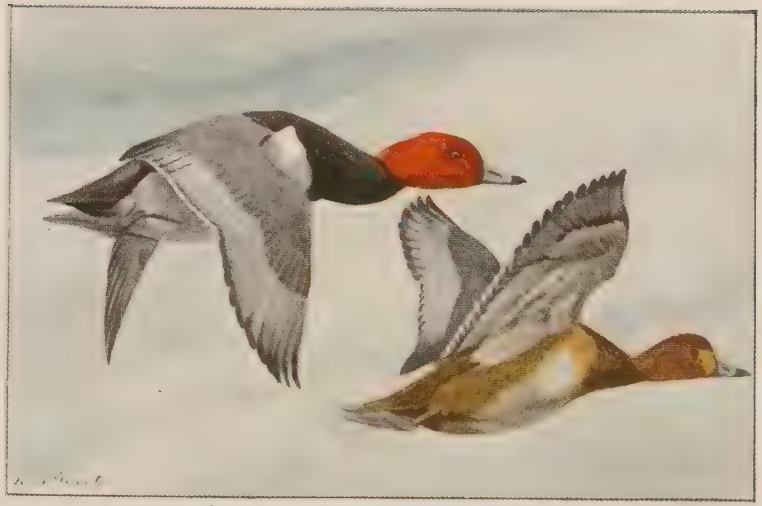
The Shoveler is a swift flier and is capable of enduring flight, as is apparent from the fact that annually it finds its way from Alaska over the 2,000 miles of intervening ocean to the Hawaiian Islands. There it winters, and the few that escape the island sportsmen retrace their way across the tractless ocean in spring.

For biographies of BLUE-WINGED TEAL, CINNAMON TEAL, and EUROPEAN WIDGEON, see page 169.



Male Female

PINTAIL



Male Female

REDHEAD

Female Male Female

CANVASBACK

Male Female Male Female Male Female

GREATER SCAUP LESSER SCAUP RING-NECKED DUCK

AMERICAN PINTAIL (Dafila acuta tzitzihoa)

Range: Breeds on Arctic coast from Alaska to Keewatin and south to southern California, southern Colorado, northern Nebraska, northern Iowa, and northern Illinois; winters from southern British Columbia, Nevada, Arizona, southern Missouri, southern Wisconsin, southern Ohio, and Delaware south to Porto Rico, Panama, and Hawaii.

Characteristics: The Pintail, one of our most beautiful Ducks, is easy of recognition owing to its long slender neck and elongated pointed tail. The latter has caused it to be known locally in England as the "Sea Pheasant." This continues to be one of our most common ducks, but is most abundant in the West.

It is swift of wing, and an old Pintail coming down wind will tax the nerve and skill of the most experienced sportsman. In California I once witnessed a life and death race between an adult male Pintail and a Prairie Falcon. The Duck covered a half mile at its topmost speed, but notwithstanding its swiftness, the Falcon outmatched it, and would have dined on Duck that October day had not the fowl, apparently realizing the extremity of its danger, swerved in a half circle toward me, the interested spectator, when the Falcon, too distrustful of man to follow, gave up the chase in disgust.

Nelson states that in Alaska in August the Pintail fattens on berries and becomes the most delicious waterfowl of the region.

The Pintail is one of the few Ducks that braves the long 2,000-mile trip from the Aleutians to the Hawaiian group to winter.

CANVASBACK (Aristonetta valisineria)

Range: Breeds from central British Columbia, Fort Yukon, Great Slave Lake, and southwestern Keewatin south to Oregon, northern Nevada, Nebraska, and southern Minnesota; winters from southern British Columbia, Nevada, Colorado, Illinois, Pennsylvania, and western New York south to central Mexico (Jalisco) and the Gulf coast.

Characteristics: The Canvasback, perhaps the most famous of American waterfowl, has purchased its fame at a price. Not that the Canvasback differs essentially from other Ducks, but its exceptional flavor is due to the fact that its favorite food is "wild celery," a long ribbonlike grass which grows in shallow ponds and estuaries. As the plant roots several feet under the surface, only the diving Ducks can secure it.

In Oregon and Washington the Canvasback lives much upon wapato, a bulblike root formerly a staple article of food among many Indian tribes, and its exceptional flavor is said to be little, if any, inferior to that of the celery-fed Canvasback of the East. Elsewhere the flesh of the Canvasback is in nowise superior to that of other Ducks, and in some localities on the West coast, indeed, is inedible because of its rank smell and taste.

Prized alike by the sportsman and by the epicure, the ranks of the Canvasbacks were formerly depleted, but have recently increased. The greater number of these Ducks breed far to the northward where they are safe in summer.

REDHEAD (Nyroca americana)

Range: Breeds from southern British Columbia, central Alberta, central Saskatchewan, and southwestern Keewatin south to southern California, Utah, southern South Dakota, southern Minnesota, and southern Wisconsin; winters from southern British Columbia, Utah, New Mexico, Kansas, Illinois, Maryland, Delaware, and Massachusetts south to southern Lower California, central Mexico, and Florida.

Characteristics: In the minds of epicures and sportsmen the Redhead is closely associated with the Canvasback. Both species often frequent the same feeding grounds and, as the Redhead is as expert at diving as its cousin, it has no difficulty in obtaining its share of the coveted wild celery. This naturally imparts to its flesh the same highly prized flavor as that of the Canvasback, and he must possess a delicate taste who can distinguish the difference.

The Redhead is much more numerous east of the Rocky Mountains than to the west of that chain and, while many visit the bays and estuaries of the East coast, the Duck's preference appears to be for inland lakes and ponds where it subsists upon various aquatic plants, insects, snails, acorns, beechnuts, and in fact upon almost anything that is edible by waterfowl standards.

The stopping of spring shooting and of market hunting has saved this bird from a serious decrease that was threatening its future.

GREATER SCAUP DUCK (Marila marila nearctica)

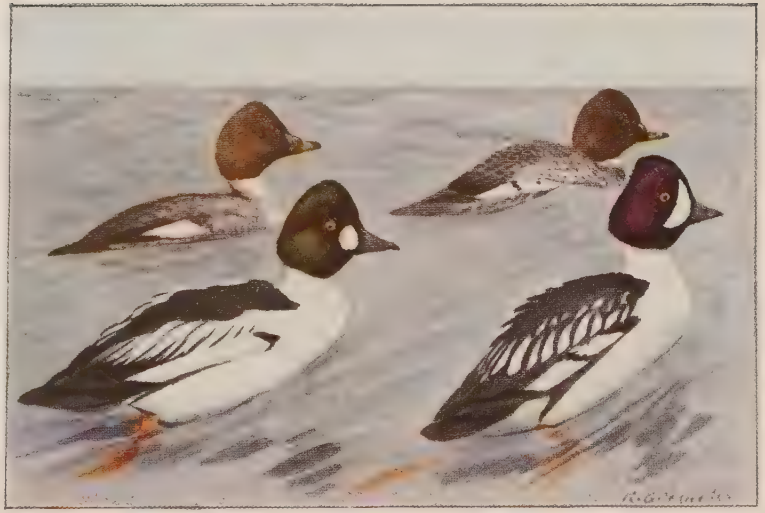
Range: Breeds from Aleutian Islands, northwestern Alaska, Great Slave Lake, and central Keewatin south to southern British Columbia and northern North Dakota; winters from Maine to Florida and the Bahamas, and from Aleutian Islands, Nevada, Colorado, and Lake Ontario south to southern California, southern New Mexico, and southern Texas.

Characteristics: Both on the East and West coasts the Scaup Duck is emphatically a bay or estuary species and prefers salt or brackish water. Formerly it frequented such localities in flocks of thousands, often associated with the Lesser Scaup from which it is not readily distinguishable at a distance. Notwithstanding the fact that both Scaups breed chiefly in the far north, their numbers were at one time greatly depleted. With better protection in recent years large rafts of these birds in places again gladden the hearts of sportsmen.

The Greater Scaup used to winter in great numbers in the estuaries of the Gulf States and in the troubled waters of Lake Borgne. In heavy gales, I have seen "rafts" of bobbing, black heads that apparently extended for miles. Even in those days (1871) the Scaup had learned wisdom, and in open water was shot with great difficulty from skiff or sailboat.

Both Scaups are expert divers and are formidable competitors of the Canvasback and Redhead in their quest for the rootstocks of wild celery. In the interior the insects, snails, and wild rice they eat are obtained without the trouble of deep diving.

For biographies of LESSER SCAUP and RING-NECKED DUCKS, see page 171.



Female Male — GOLDEN-EYE

Female Male — BARROW'S GOLDEN-EYE

Male Female — BUFFLEHEAD

Female Male Winter Plumage — OLD SQUAW

Male Female — HARLEQUIN DUCK

AMERICAN GOLDEN-EYE (Glaucionetta clangula americana)

Range: Breeds from central Alaska, northern Mackenzie, central Keewatin, northern Ungava, and Newfoundland south to southern British Columbia, southern Montana, northern North Dakota, northern Michigan, northern New York, and northern New England; winters from Aleutian Islands, Utah, Nebraska, Minnesota, Lake Erie, Maine, and New Brunswick south to southern California, central Mexico, and Florida.

Characteristics: Though classed as a "bay or sea Duck," the Golden-eye, or Whistler, is partial to broad rivers or estuaries, and formerly abounded in the Eastern States. Though by no means the only Duck to make a whistling sound with its wings as it hurtles through the air, the Golden-eye "whistles" louder than any other, and sometimes, indeed, announces its approach by its whistling wings before its oncoming form can be distinguished.

Certain of our Ducks, among them the Whistler, have learned that a nest full of eggs is never quite safe when entrusted to Mother Earth, no matter how artfully concealed. Hence, these birds lay their eggs in hollow trees often many feet from the ground.

The Whistler is an excellent diver, and in some localities utilizes its skill to procure mussels from the bottom. The bird has not only learned the range of a shotgun to a nicety, but also the dangers that lurk in blinds, sink boats, and the like, and in a general way by cunning and wariness has shown itself well able to care for its safety. Nevertheless, there are few places where Whistlers exist in their former abundance.

OLD SQUAW (Clangula hyemalis)

Range: Breeds from islands of Bering Sea, Arctic coast of Alaska, Melville Island, Wellington Channel, Grinnell Land, and northern Greenland south to Aleutian Islands, east-central Mackenzie, northern Hudson Bay, and southeastern Ungava; winters from Aleutian Islands south regularly to Washington, and in southern Greenland, and from Gulf of St. Lawrence south regularly to the Great Lakes and North Carolina.

Characteristics: Breeding, as it does, in faraway Arctic lands, and visiting the United States only in late fall and winter, this beautiful and graceful Duck is known to only a few and these chiefly sportsmen. The flesh of the Old Squaw does not commend itself to civilized palates, and yet under the guise of sport thousands were annually slaughtered, especially in spring, because, forsooth, their swift flight made them tempting marks for the wing shooter. Bags of two or three hundred were not uncommon, although so little were they esteemed that, as Forbush states, many were allowed to lie where they fell or were thrown away.

The Old Squaw has a habit of circling high in air and then descending in spirals with a resounding rush of wings. Flocks of a hundred or more sometimes participate in this pastime. This Duck is a master diver and, according to Eaton, individuals have been netted in the Great Lakes at the extreme depth of 162 feet.

BUFFLEHEAD (Charitonetta albeola)

Range: Breeds from upper Yukon, lower Mackenzie, Great Slave Lake, and central Keewatin south to British Columbia, northern Montana, and central Ontario; winters from Aleutian Islands, British Columbia, Idaho, Colorado, Missouri, southern Michigan, western New York, and New Brunswick south to northern Lower California, central Mexico, and Florida.

Characteristics: The common name of this little Duck is strikingly suggestive of its appearance, for the head, with its white markings and fluffy feathers, seems too big for the diminutive neck and body. An equally suggestive name in fall, when it becomes very fat, is "Butterball."

Though by no means strictly confined to fresh water, the Bufflehead prefers it, and is more abundant on the larger lakes and ponds of the West than in Eastern Waters. Wherever found, East or West, it is extremely friendly, and when the gunner puts out a flock of wooden decoys our little Duck immediately responds to the invitation to alight and be sociable. Taking advantage of this amiable weakness, the gunner has already reduced the number of Buffleheads well below their former abundance, although they are still numerous.

Very few Ducks can dive more quickly at need than the Bufflehead, and in this respect it almost rivals the little Grebe, known as the "Water-witch" or "Hell-diver." This skill as a diver is of great service to the Duck in its search for food. It is adept at catching small fish and, perhaps, because of this and other animal food, its flesh is not greatly esteemed.

HARLEQUIN DUCK (Histrionicus histrionicus and subspecies)

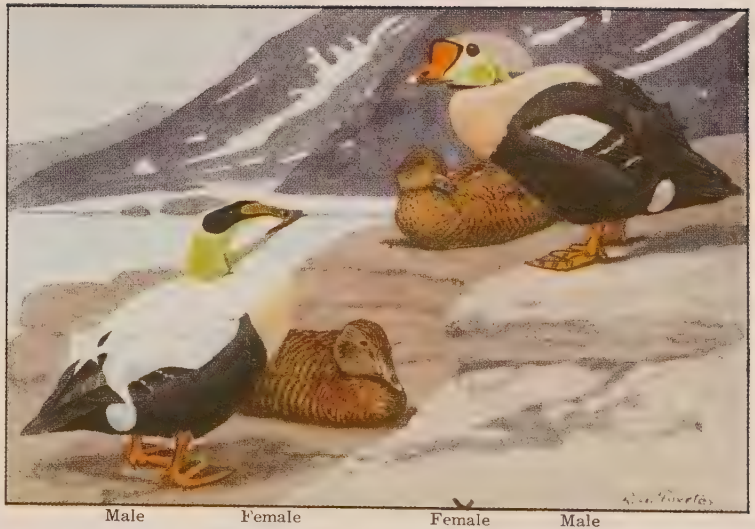
Range: Breeds from Kowak and Yukon rivers, Alaska, Arctic coast, and Greenland south to southwestern British Columbia, central Mackenzie, northern Ungava, and Newfoundland, south in mountains to central California, southwestern Colorado, northeastern Asia and Iceland; winters on Pacific coast from Aleutian Islands to Monterey, California, in interior to Colorado, Missouri, Lake Michigan, and western New York, and on the Atlantic coast from Gulf of St. Lawrence regularly to Maine.

Characteristics: The name "Harlequin" suggests the unusual and somewhat bizarre plumage of this Duck which, nevertheless, deserves to be classed among our most beautiful waterfowl. Rare everywhere in the United States except along our northwest coast, the Harlequin breeds commonly in Alaska and uncommonly in the States from Colorado and California northward. Unlike most other Ducks, the Harlequin disdains to nest in the lowlands, but in summer withdraws from its kind and hies to the mountain solitudes where it dwells on the swift alpine streams, its only companion the Water Ouzel. In fall it resorts to the coast.

For biography of BARROW'S GOLDEN-EYE, see page 163.

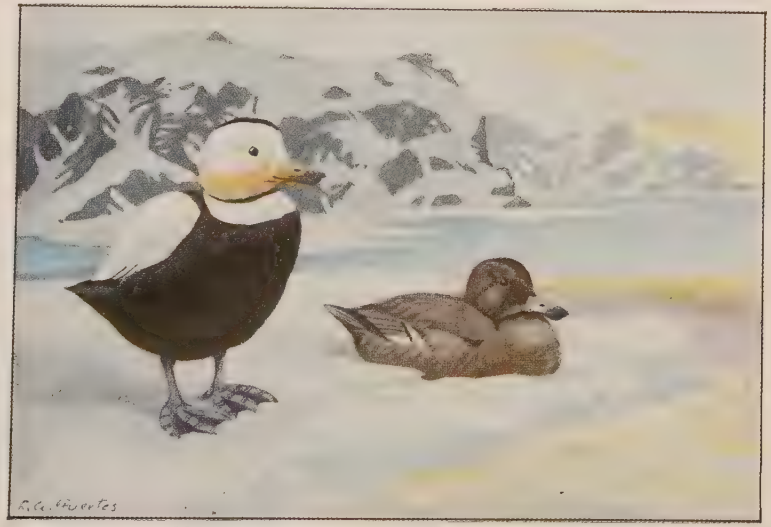
Female Male

STELLER'S EIDER SPECTACLED EIDER



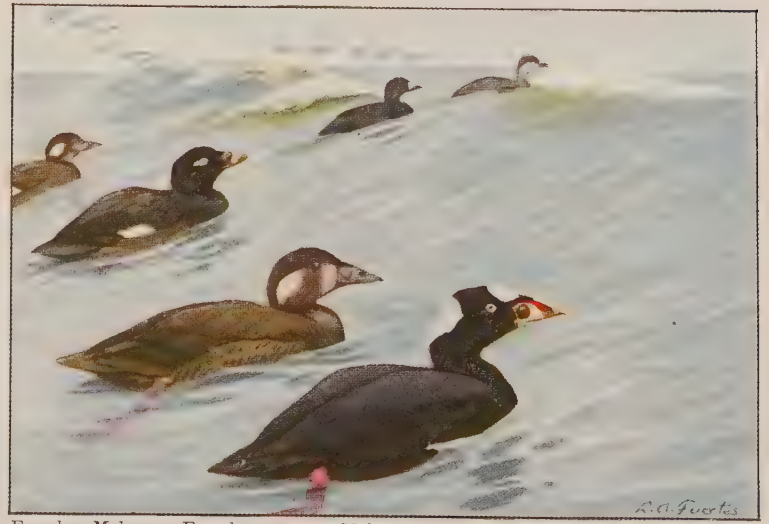
Male Female Female Male

EIDER KING EIDER



Male Female

LABRADOR DUCK



Female Male Female Male Male Female

WHITE-WINGED SCOTER SURF SCOTER AMERICAN BLACK SCOTER

STELLER'S EIDER (Polysticta stelleri)

Range: Breeds from Point Barrow, Alaska, to northern coast of Siberia and south to Aleutian Islands; winters on Aleutian Islands and Kenai Peninsula, Alaska, and south on the Asiatic coast to Kuril Islands.

Characteristics: Steller's hardy and beautiful Duck is American by virtue of our possession of Alaska, for even in winter it does not venture south as far as either the Atlantic or the Pacific coast States. According to Nelson, the coast and islands of Bering Sea constitute the eastern range of this Eider, and it breeds by tens of thousands on the north Siberian coast.

Nelson found these Ducks rather numerous in the quiet waters of bays and fiords of the Aleutian Islands the last of May, but they were very shy and he failed to secure a single individual. They winter in such of the Alaskan bays as are free from ice, and at this season the natives who depend upon them for winter food kill great numbers. This Eider is a true sea Duck and Turner notes that it keeps well offshore except in boisterous weather. Needless to say, its food consists of animal life gleaned from the sea and the bird is a skillful diver, reaching great depths and staying under a long time, as do Eiders generally.

LABRADOR DUCK (Camptorhynchus labradorius)

Range: Formerly, northern Atlantic coasts; supposed to have bred in Labrador; wintered from Nova Scotia south to New Jersey.

Characteristics: The Labrador Duck's history is shrouded in mystery. It is now known to be extinct but of the causes of its disappearance we know little or nothing. Occupying as it did such a restricted range, the bird was probably never abundant, at least in historic times. Many years ago George N. Lawrence told me that in his recollection, somewhere probably about 1850, it was by no means uncommon in Fulton Market, and no one at that time appears to have suspected that the bird was in any particular danger of extinction. Apparently its habits were those of a sea Duck, and as it could have possessed no great value for the table there would seem to have been no particular incentive for its pursuit.

We know so little about the bird that speculation as to the cause of its extinction is useless but, as suggested by Forbush, the slaughter of waterfowl on the Labrador coast in the eighteenth century may have had much to do with it. The lesson to be drawn from its fate is that if a game bird like the Labrador Duck can become extinct in historic times from no assignable cause, we should be doubly careful not to reduce the numbers of any of our valuable game birds to a point which threatens their future.

So far as known, the last Labrador Duck seen alive by man was taken at Grand Manan on the Maine coast in 1871. Fortunately, some forty-odd specimens are known to be in museums and in private collections.

For biographies of SPECTACLED EIDER, KING EIDER, SURF SCOTER, and AMERICAN BLACK SCOTER, see pages 172-173.

EIDER (Somateria dresseri)

Range: Breeds from southern Ungava and Newfoundland to southeastern Maine, and on southern half of Hudson Bay; winters from Newfoundland and Gulf of St. Lawrence south on Atlantic coast regularly to Massachusetts.

Characteristics: The present species, the Eider of northeastern United States, differs only slightly from the Northern Eider, which comes south rarely, and the Common Eider of Europe, from which are derived much of the eiderdown of commerce. Female Eiders anticipate the needs of their eggs for a warm, soft bed by lining their nests with down plucked from their own breasts. In Iceland this downy lining is coveted by the natives who appropriate it. Males, equally solicitous for the welfare of the eggs, in turn denude their breasts of down and replace the lining. This is also taken, after which the birds are allowed to hatch their brood in peace.

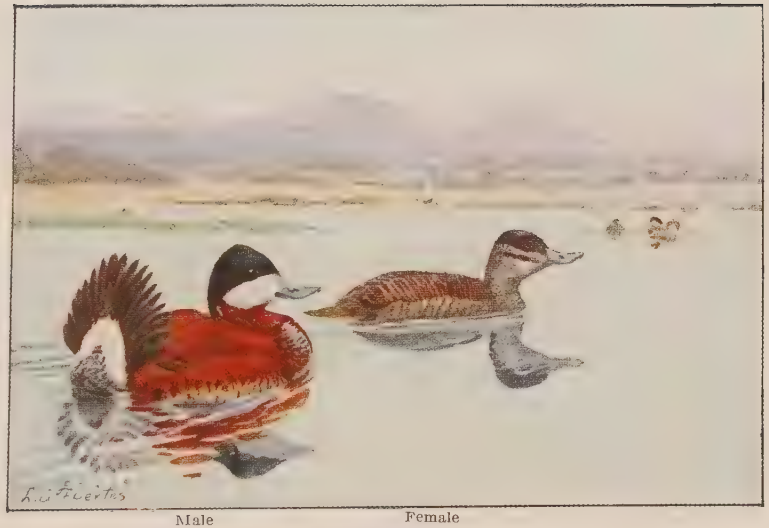
Needless to say, the Eider is carefully protected in Iceland, and hence the crop of down is a perennial one.

This Duck was formerly abundant and indeed nested along the coast from Maine northward. Eiders are much less numerous than formerly within our territory, for they have been ruthlessly killed. Although much reduced in numbers at one time, better protection within recent years appears to have resulted in their increase locally, at least. The Eider is a true marine Duck and well deserves the title of Sea Duck bestowed upon it by gunners. So hardy are these birds that they choose to keep to the open sea during the severest storms, and rely for their preservation on their unsurpassed powers of swimming and diving. Eiders live largely upon mussels, which they obtain in 50 feet or more of water.

WHITE-WINGED SCOTER (Melanitta deglandi)

Range: Breeds from the coast of northeastern Siberia, northern Alaska, northern Mackenzie, and northern Ungava south to central British Columbia, Alberta, northern North Dakota, and southern Quebec; winters on the Asiatic coast to Bering Island, Japan, and China, and in North America from Unalaska Island to San Quintin Bay, Lower California, the Great Lakes and the Atlantic coast from the Gulf of St. Lawrence south (rarely) to Florida; nonbreeding birds occur in summer as far south as Rhode Island and Lower California.

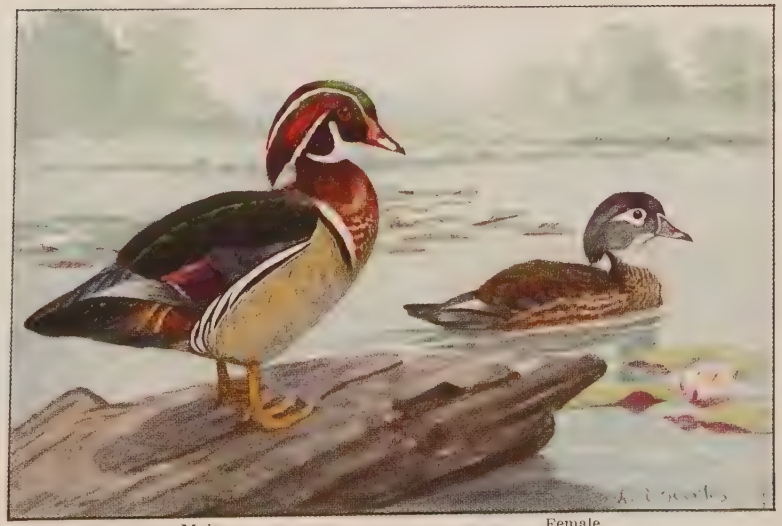
Characteristics: The general habits of this Scoter correspond closely with those of its relatives. It winters in great numbers in company with other Coots on the coast of the New England and Middle States, and also along our West coast, especially in Oregon and Washington. Scoters are denizens of the sea and are almost as much at home there as the fish, crustaceans, and shellfish upon which they feed. So large are some of the shellfish that have been found in their stomachs that it is difficult to understand how the birds manage to swallow them, and equally difficult to comprehend how they can digest the hard, thick, calcareous shell. This they do, however, with ease and celerity, and the digestive feat is one an ostrich might well be proud of.



Male Female

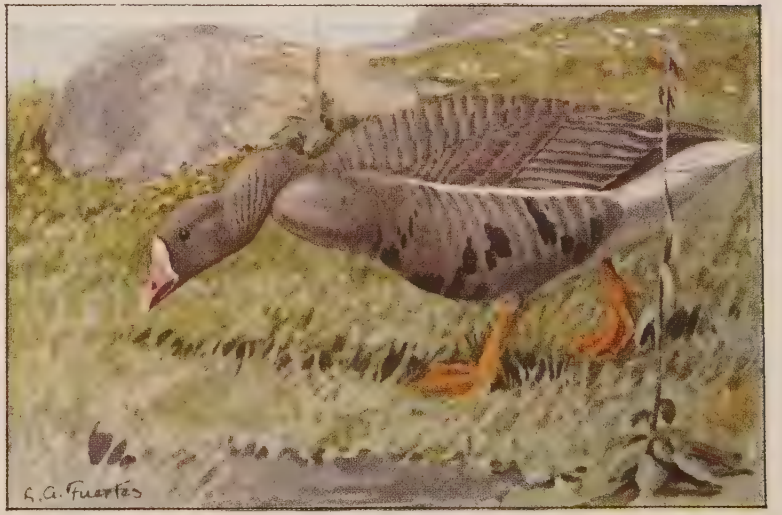
RUDDY DUCK

FULVOUS TREE DUCK



Male Female

WOOD DUCK



WHITE-FRONTED GOOSE

RUDDY DUCK (Erismatura jamaicensis)

Range: Breeds from central British Columbia, Great Slave Lake, southern Keewatin, and northern Ungava, south to northern Lower California, central Arizona, northern New Mexico, northwestern Nebraska, southern Minnesota, southern Michigan, southern Ontario, and Maine and locally south to Guatemala and Porto Rico; winters from southern British Columbia, Arizona, New Mexico, southern Illinois, Maine and Pennsylvania, south to the Lesser Antilles and Costa Rica.

Characteristics: The Ruddy Duck, or "Dumb Bird," as it is called in New England, alias the Rook of the Potomac region, has a wide range in the United States from seacoast to seacoast, and formerly nested over much of this wide territory. That it is not unknown to sportsmen and others is attested by the fact that Trumbull in his "Names and Portraits of Birds" gives sixty-seven synonyms under which it appears. Some of these, as "Deaf Duck," "Fool Duck," "Dumb Duck," are indicative of its disposition; while others like "Bull Neck," "Spine-tail Duck," mark physical peculiarities.

In appearance it is quite unlike any other Duck, and when swimming, its plump, round body and uplifted tail serve to distinguish it to the merest tyro. It is extremely sociable and unites in large flocks, sometimes in company with other species. Over most of its range the little Ruddy Duck was formerly lightly esteemed for food, and consequently enjoyed comparative immunity from the pursuit of sportsmen and even from market gunners. As other more highly prized species diminished in numbers, the Ruddy attracted more attention. and in waters like the Potomac River, where the Rookies formerly gathered in the fall by thousands, only a beggarly remnant remains. Ruddies are the more easily killed because they do not readily take wing, but being expert divers endeavor, when pursued, to escape by diving. The gunner aware of this weakness has only to persist in pursuit of the birds, one after another, to secure most or all of a flock.

WOOD DUCK (Aix sponsa)

Range: Breeds from southern British Columbia, central Saskatchewan, northern Ontario, New Brunswick, and Nova Scotia south to central California, southern Texas, Florida, and Cuba; winters chiefly in the United States from southern British Columbia, Kansas, Illinois, Indiana, Pennsylvania and New Jersey to southern California and the Gulf of Mexico.

Characteristics: However divided the sportsmen of America may be on the many questions affecting their rights and privileges, they should one and all unite in an attempt to preserve the existence of the Wood Duck, perhaps the most beautiful of the Duck tribe. It is true that in some sections of the country the Wood Duck is now abundant, but no one conversant with the present state of affairs can doubt that a lifting of the present closed season on them would result in their extermination in many areas. There are many sportsmen whose memories go back to the time when this beautiful bird abounded in most of the wooded sections of eastern United States, in some areas where now few, if any, remain.

The result of continuous protection under the Migratory Bird Treaty for ten years has been generally satisfactory. It will be to our everlasting shame if this, one of the most perfect of Nature's creatures, is allowed to meet the same fate as the Passenger Pigeon. Practically all the Wood Ducks nest and winter within our own boundaries.

FULVOUS TREE DUCK (Dendrocygna bicolor)

Range: Breeds in North America from central California, middle-western Nevada, southern Arizona, and central Texas south to the Valley of Mexico and Michoacán; winters from central California and central Texas to southern Mexico. This species is also resident in South America.

Characteristics: The Tree Ducks are tropical species, two of which, the Black-bellied and the Fulvous Tree Ducks, extend their range into the United States. In this country at least there is little to warrant the name of Tree Duck, as the bird is no more arboreal, if as much so, than the Wood Duck. No doubt it alights in trees in wooded districts, and very probably it occasionally nests in hollow trees, as do several others of our Ducks; more often, however, it nests on the ground for the sufficient reason that much of the territory it inhabits is practically treeless.

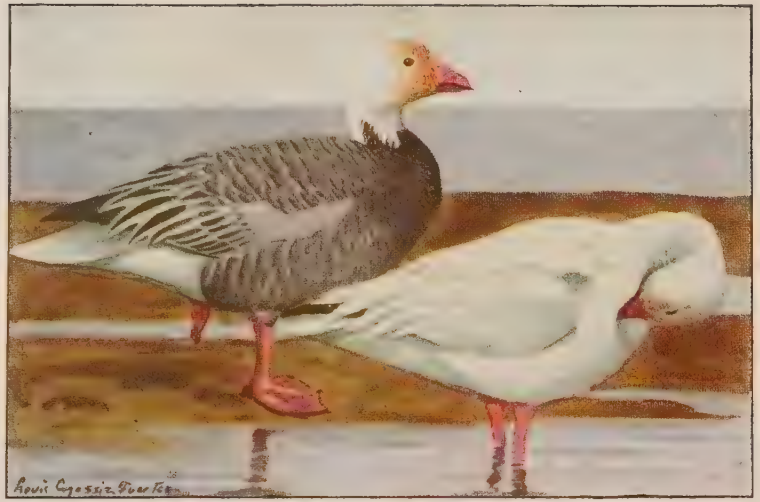
The only place in which I ever saw this species was Washoe Lake, Nevada, and there its habits are so similar to other Ducks which frequent shallow lakes that at first I hardly recognized it. It is much more numerous in southern California than in Nevada.

This Duck is credited with laying an unusually large clutch of eggs, from 15 to 30, but very probably the larger number is the result of two or more females laying in the same nest on a coöperative basis.

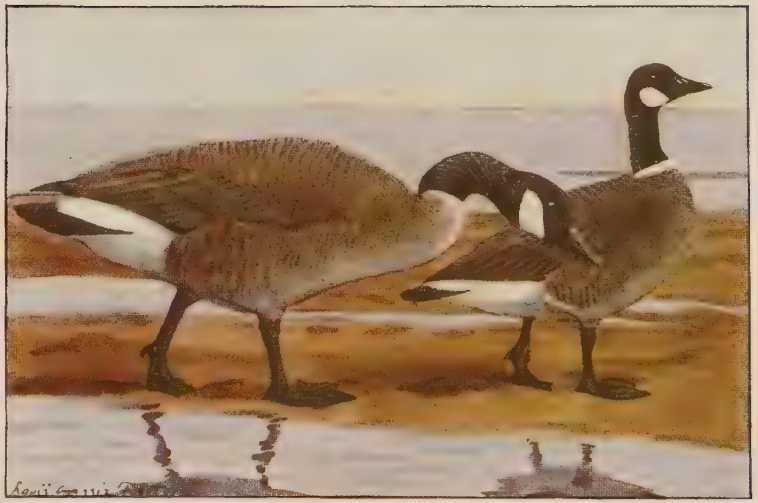
AMERICAN WHITE-FRONTED GOOSE (Anser albifrons gambeli)

Range: Breeds on and near the Arctic coast from northeastern Siberia east to northeastern Mackenzie and south to lower Yukon Valley; winters from southern British Columbia to southern Lower California and Jalisco.

Characteristics: Though occasionally met with on the Atlantic coast and not uncommon in the Mississippi Valley, the White-fronted Goose is essentially a bird of the Far West, and is particularly abundant in the Pacific coast States. This is one of the Geese which used to visit the wheat fields of California in such numbers as to threaten the crop, and which men were hired to kill and frighten away. The hordes of former days are now represented by comparatively small numbers, and as the flesh is toothsome the problem of the near future is not how to destroy the birds most cheaply but what methods to employ to preserve them. White-fronted Geese were found by Nelson breeding abundantly in the Yukon delta from the last of May till well into June. Their nests are placed on the grassy borders of lakelets, whence the young can be quickly led into the protecting water.

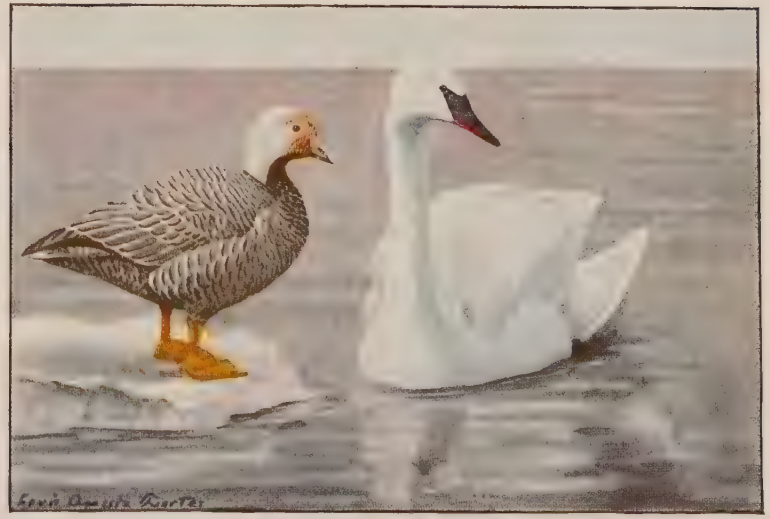


BLUE GOOSE SNOW GOOSE



CANADA GOOSE CACKLING GOOSE

BRANT BLACK BRANT



EMPEROR GOOSE TRUMPETER SWAN

BLUE GOOSE (Chen cærulescens)

Range: Breeds probably in interior of Baffin Land; winters on coastal marshes of Mississippi, Louisiana, and Texas.

Characteristics: We know comparatively little of the life history of the Blue Goose. That it breeds in the far north is certain. Few ornithologists have ever seen the bird, even in migration, though it is known to pass up and down the Mississippi Valley in considerable numbers. If this Goose migrates by night as well as by day, one reason for its apparent scarcity is evident.

The winter home of the Blue Goose is now known to be practically restricted to the Gulf Coast marshes, where several hundred thousand gather each season and share this winter paradise with their close relatives, the White Geese. Like all its relatives, this species is strictly vegetarian. Eaton, in his "Birds of New York," after remarking that the Blue Goose is one of the rarest waterfowls which visit the waters of New York State, gives the following synonyms under which the bird is known locally: Blue Snow Goose, Blue-winged Goose, Blue Wavy, White-headed Blue Brant, White-headed Goose. The list would seem to indicate that at some time or other the Goose was more widely distributed than at present.

AMERICAN BRANT (Branta bernicla glaucogastra)

Range: Breeds on the Arctic islands north of latitude 74° and west to about longitude 100°, and on the whole west coast of Greenland; winters on the Atlantic coast from Massachusetts south to North Carolina

Characteristics: The Brant has always been a favorite object of pursuit by sportsmen, and many clubs have been formed, the main object of which is Brant shooting. Whatever be the cause, or the combination of causes, the Brant is not nearly so abundant as it was formerly, and while there would seem to be no danger of its extinction yet its habits and limited distribution call for careful conservation. As pointed out by Forbush, while Brant are well protected in summer by the remoteness and inaccessibility of their nesting grounds, the short Arctic season with the possibility of early storms exposes their young to great danger. One or more unfavorable breeding seasons in the Arctic, combined with the activity of sportsmen along the south Atlantic coast, might quickly jeopardize the safety of the species.

The Brant is not a diver and it procures its favorite food, eel-grass, when the tide is low. Its apparent inability to dive for its food seems all the more remarkable since when wounded it not only can dive well but swim under water for a considerable distance.

The flesh of the Brant is usually excellent, although, as is the case with waterfowl generally, its flavor depends largely upon a variety of circumstances, especially upon the nature of its food for a few weeks prior to its being killed.

For biographies of SNOW GOOSE, BLACK BRANT, CACKLING GOOSE, and TRUMPETER SWAN, see pages 173, 174 and 175.

CANADA GOOSE (Branta canadensis and subspecies)

Range: Breeds from northern Alaska, barren grounds of Canada and Baffin Land south to California, Utah, Arkansas, and Gulf of St. Lawrence; winters south to the Gulf Coast, central Mexico, and Lower California.

Characteristics: This, one of the largest of our waterfowl, is notable in many respects other than mere size. The wedge-shaped flocks of Wild Geese that, spring and fall, with melodious honking, wing their way respectively to their breeding and wintering grounds, are a very familiar sight, and advertise in a most spectacular way that wonderful phenomenon—bird migration. The bird observer of speculative mind may find interest in answering the question—Why do Geese usually fly in wedge formation? Is it because the powerful wings of the leader make easier the passage of those behind him or, as suggested by Forbush, does the wedge formation enable each individual member of the flock to see better?

Formerly the Canada Goose, despite its name, nested in much of our territory and as far south at least as Massachusetts. To-day comparatively few Geese nest within our borders, although Goslings, convoyed by their parents, may still be seen on some of our Western lakes.

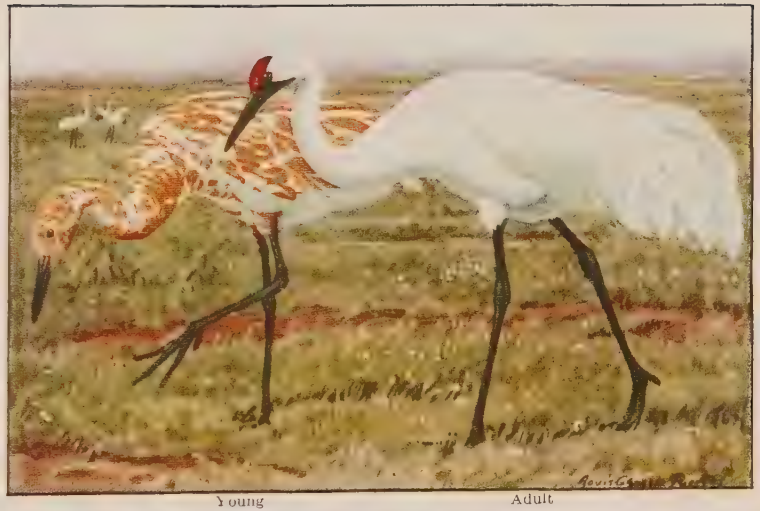
The "honker" is still far from extinct, and owes its numbers to its wariness and to the fact that it nests chiefly in the unfrequented territory of the far north, where its only enemies are the wild beast and the roving Indian.

EMPEROR GOOSE (Philacte canagica)

Range: Breeds on coast of Alaska from Kotzebue Sound south to the mouth of the Kuskokwim, on St. Lawrence Island, and also on Chukchi Peninsula, Siberia; winters from Commander and Near Islands east through Aleutians to Sitka; stragglers occur south to California.

Characteristics: Geese are strong of wing and of adventurous disposition and to most of the tribe a migration of 1,000 miles is a trifling matter. The Emperor Goose appears to be as strong as any of its fellows and equally good on the wing, which makes all the more remarkable the limited area it occupies in Alaska. "By the Aleuts these birds are called 'Beach Geese'," says Nelson, "from their habit of frequenting the island beaches to feed. These Geese arrived in force in the Yukon delta about the first of June, while the river was still under a firm sheet of ice and heavy snow banks covered half the earth. Soon after arrival they paired, the males when mated being very pugnacious. They nested on the salt marshes, and the eggs, five to eight in number, were frequently deposited among the driftwood below high-water mark.

"The young appear about the last of June and the adults moult from the last of July to the middle of August. Now comes the opportunity of the Eskimo, who set long lines of nets across the marshes, into which they drive the hapless waterfowl which have moulted their quill feathers and cannot fly. The slaughter is enormous."



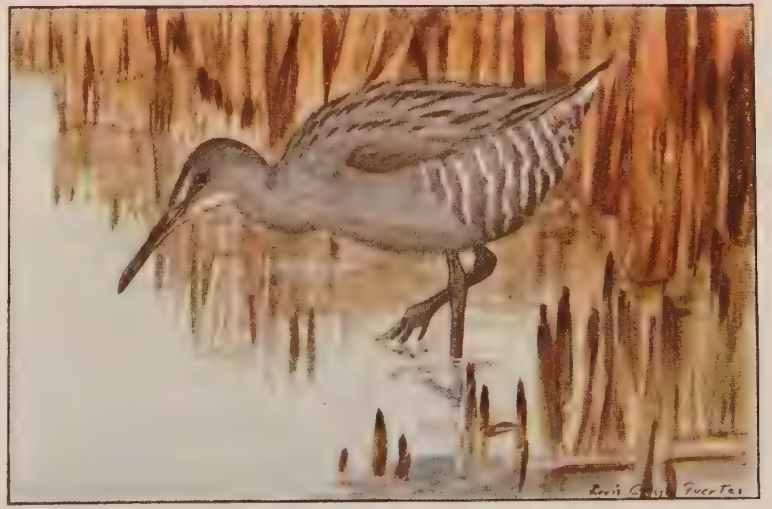
Young Adult

WHOOPING CRANE

Adult Young

SANDHILL CRANE

KING RAIL



CLAPPER RAIL

WHOOPING CRANE (Megalornis americana)

Range: Breeds now mainly in northern Saskatchewan; winters from Louisiana to northern Mexico.

Characteristics: If we go back about a century we find this, the largest of our Cranes, abundant and nesting over a vast area stretching from the Mackenzie region to Iowa, a strip 1,500 miles long by less than 300 miles wide. Cooke states that eggs of this species were taken in Iowa as late as 1894, and at Yorkton, Saskatchewan, as late as May 16, 1900.

Nuttall, speaking of a night on the Mississippi in December, 1811, says, "The whole continent seemed as if giving up its quota of the species to swell the mighty host. The clangor of their numerous legions, passing along, high in air, seemed almost deafening."

To-day what a contrast! The clangor of passing multitudes no longer fills the air, for this noble bird is now extinct in the Atlantic States, while only a few pairs, becoming less each year, manage to maintain themselves in far out-of-the-way places.

In early colonial times the Whooping Crane was taxed with pillaging cornfields, and doubtless suffered for its crimes. Moreover, its flesh was reputed to be excellent, and no doubt this fact contributed to its destruction. One of the regulations under the Federal law fixed a closed season till 1918 for our three species of Cranes —Whooping Crane, Sandhill Crane, and Little Brown Crane—but, so far as the first-mentioned species is concerned, the regulation probably came too late.

KING RAIL (Rallus elegans)

Range: Breeds from Nebraska, southern Minnesota, Ontario, New York, and Connecticut south to Texas, Florida, and Cuba; winters mainly in southern part of its breeding range.

Characteristics: The King Rail, the largest and handsomest of its family, is trim of form, moves with an air of conscious grace, and is tastefully garbed in colors which harmonize wonderfully with the vegetation of swamp and meadow, among which it passes its life. Moreover, it possesses in the highest degree that form of beauty which consists in the perfect adaptation of means to end, for its entire make-up is in keeping with its mode of life.

Anyone familiar with the appearance of the Virginia Rail will recognize the King Rail on sight, since it is a near counterpart of that bird, except in size. It lives exclusively in fresh-water meadows, and so adept is it at the game of hide-and-seek that, though you may mark one down to a foot, it is rarely that either man or dog can put it up a second time, though the cover may appear to be insufficient to conceal even a Sparrow.

When on the wing the bird appears to fly with great effort. As a matter of fact, it can fly well enough for all practical purposes, but it has a pair of stout legs quite capable of taking their owner out of harm's way under ordinary circumstances, and it usually prefers to intrust its safety to these members.

This Rail is prolific, laying from seven to twelve eggs, and, as it offers no great temptation to the sportsman as a mark, it should long continue a denizen of our fresh-water marshes.

SANDHILL CRANE (Megalornis canadensis and subspecies)

Range: Breeds from Arctic tundras of eastern Siberia, Alaska, and Canada south to California, Louisiana, Florida, and Cuba; resident in three last-named areas; winters from California, Texas, and Louisiana south to Florida, Cuba, and Mexico.

Characteristics: The Sandhill Crane seems most at home on broad expanses of prairies and marshes, which offer it food and security. Although extinct in many of its former haunts, it still exists in small numbers in Louisiana, Florida, and Cuba. It is more numerous in its remote northern haunts. As the Crane struts majestically about, it keeps a watchful eye for enemies, and when the danger proves threatening, it spreads its broad wings and with measured beats flies slowly away. Its loud buglelike notes, when heard from mid-air, as the birds slowly pass out of sight, have a delightful musical quality.

The food of this Crane consists of a large variety of animal life, among which are grasshoppers and meadow mice, so that a distinct claim of economic usefulness may be made for it. Unfortunately for its safety, its meat is by no means unpalatable and in some localities it is much sought after for food. The restriction of its breeding and feeding grounds by settlement, however, has had more to do with the decrease in its numbers than firearms.

CLAPPER RAIL (Rallus longirostris and subspecies)

Range: Breeds in coastal marshes from Connecticut to Central and eastern South America and West Indies; usually resident except in extreme northern part of range.

Characteristics: The distribution of the Clapper Rail complements that of the King Rail in the United States, for the Clapper inhabits the salt-water marshes as its relative does the fresh-water meadows. They are scarce in the North, but abundant in South Atlantic and Gulf Coast marshes.

When on Cobb's Island, I once offered a small boy a quarter apiece for some of the young Clappers, as I had never seen them. In about an hour he returned and to my astonishment turned out of his cap more than a dozen of the quaint, black, fluffy youngsters, some of which apparently had just chipped the shell. It appeared that an uncommonly high tide had driven the birds from their usual haunts, and the nestlings were to be had by the dozen by wading through the reeds and picking them off the piles of floating debris. I had the pleasure of returning most of them to their native haunts, and the rapidity with which they lost themselves among the reeds showed that they needed no parental lectures on the art of concealment.

A closely allied species, the California Clapper Rail, represents the Eastern bird on the Pacific coast of Oregon and California. As the name implies, Clapper Rails are noisy birds, and their harsh notes are often heard coming from the thick reeds when the callers are invisible. They lay from seven to a dozen eggs.

Adult Young

SORA

VIRGINIA RAIL

PURPLE GALLINULE FLORIDA GALLINULE

BLACK-NECKED STILT AVOCET

SORA (Porzana carolina)

Range: Breeds from central British Columbia, southern Mackenzie, central Keewatin, and Gulf of St. Lawrence to southern California, Colorado, Kansas, Illinois, and New Jersey; winters from northern California, Illinois, and South Carolina through the West Indies and Central America to Venezuela and Peru.

Characteristics: Though distributed generally throughout the United States and breeding in fresh-water meadows almost everywhere, the Sora is far more abundant east of the Mississippi than west of it. Its chosen haunts of swamp and meadow are so rarely visited and the bird is of such secretive habits that it may abound in a given neighborhood and few be aware of the fact.

Towards the nesting season the Sora becomes garrulous, and its low, whistled notes form a pleasant addition to the early summer chorus that comes from the reedy recesses. Even in fall one has only to make an unusual noise near a Sora swamp, such as a sharp tap of the paddle on the boat, to elicit a chorus of protesting "kuks," which announce the presence of hundreds of these Rails. But it is as a titbit for the table and as a game bird that the Sora is best known in the Atlantic States, where Sora shooting is looked forward to as an annual experience not to be lightly foregone. Wherever wild rice abounds there the Rails congregate by thousands to feed on the ripening grain. At high tide the gunner in a light skiff is poled among the reeds, and as the birds rise, sometimes a dozen at a time, they form easy marks. Every fall many thousands of these Rails are killed and, although the birds lay from eight to fifteen eggs, Soras are steadily decreasing.

PURPLE GALLINULE (Ionornis martinicus)

Range: Breeds from Texas, Tennessee, and South Carolina south through Mexico and the West Indies to Ecuador and Paraguay; winters from Texas, Louisiana, and Florida southward.

Characteristics: The bright colors of the Purple Gallinule suggest a tropical origin, and the bird in fact is far more at home in tropical lands than in temperate climes. It not only runs nimbly and with grace over the leaves and stems of floating aquatic vegetation, but swims and dives well, and when suspecting danger progresses under water with only the bill visible. The general habits of the Purple and the Florida Gallinule (see page 171) are very similar.

VIRGINIA RAIL (Rallus virginianus)

Range: Breeds from British Columbia, southern Saskatchewan, southern Keewatin, Ontario, southern Quebec, and New Brunswick south to southern California, Utah, Kansas, Missouri, Illinois, New Jersey, and eastern North Carolina; winters from Oregon, Utah, and Colorado to Lower California and Guatemala; also in the lower Mississippi States, and from North Carolina to Florida.

Characteristics: The Virginia Rail is a denizen of both fresh- and brackish-water marshes, though with a decided preference for the former, especially in the nesting season. Its thin, wedge-shaped body eminently adapts it for a life among sedge and tule, among the stems of which it glides so swiftly and noiselessly that the sharpest-eyed observer rarely catches a glimpse of it. Where notified of its presence by its grunting notes, which Brewster aptly compares to the sounds of a hungry pig, one has only to sit down in a favorable spot and patiently await the time when our brown Knight of the Reeds steps daintily forth in search of food and sunlight, but in the open he betrays by his alert actions the consciousness of possible danger.

The slow, wavering flight of this Rail appears to betray the novice; nevertheless, these same wings that seem to be overtaxed in a flight of 50 yards or so are capable of carrying their owner over long distances in migration. Cooke thinks that many Soras cross the Gulf of Mexico in their passage to South America, and the Virginia Rail is probably capable of an equally protracted flight. The distance, in fact, between its extreme habitat, southern Canada and Guatemala, is approximately 2,100 miles. All Rails migrate by night and as a rule fly low.

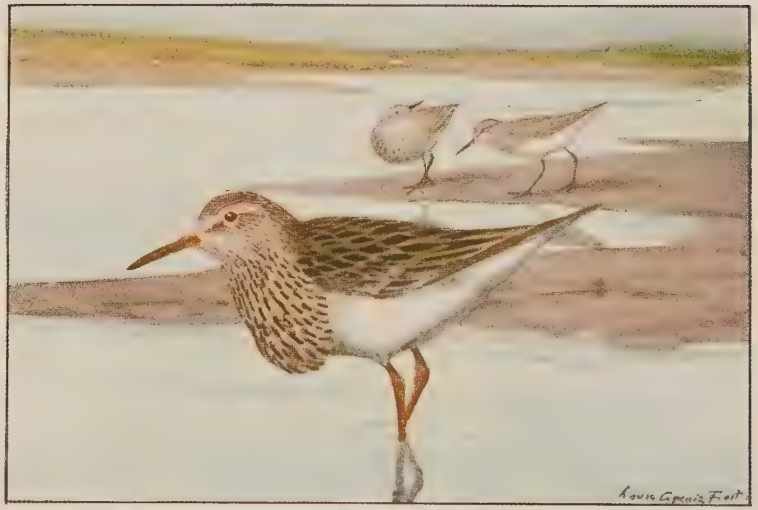
BLACK-NECKED STILT (Himantopus mexicanus)

Range: Breeds from central Oregon, northern Utah, and southern Colorado to southern California, southern New Mexico, southern Texas, coast of Louisiana, and in Mexico, and from central Florida and Bahamas throughout the West Indies to northern Brazil and Peru; winters from southern Lower California, southern Texas, southern Louisiana, and southern Florida south through Central America and the West Indies to northern Brazil, Peru, and the Galápagos.

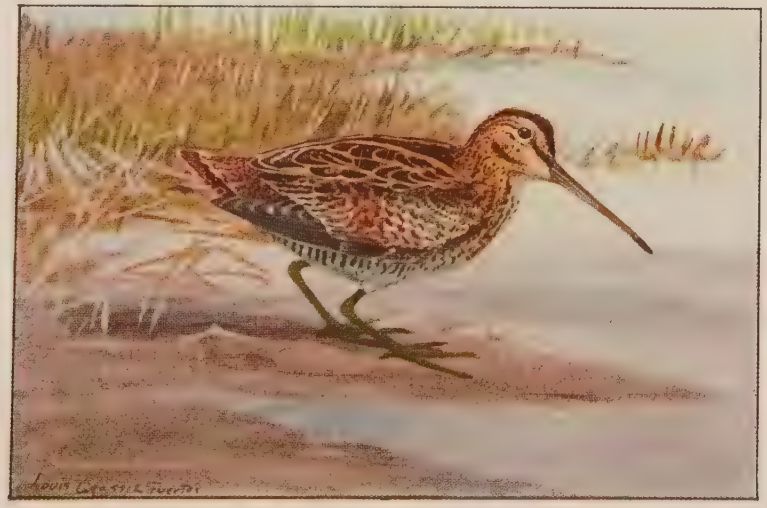
Characteristics: So commonly associated are the Stilt and Avocet and so similar are the general habits of these two very dissimilar species that the same account applies almost equally well to both. The Stilt used to be rather common in the Atlantic States, but it has suffered at the hands of gunners and few of the present generation know the bird by sight. In 1871 I saw a lone Stilt in Florida at the head of the Miami River, where it debouches from the Everglades—my sole experience with the species east of the Mississippi. But in the far Western States I have seen many hundreds leading their natural lives by lakeside or slough in company with Avocets. Even the most unobservant could not compare the general structure of these two species and fail to draw the inference that their habits must be very similar. The long bill of the Stilt, indeed, is straight instead of being curved, but otherwise it is as well equipped as the Avocet to wade in shallow waters and extract a living beneath the muddy surface.

For biographies of FLORIDA GALLINULE and AVOCET, see page 171.

Summer and Winter Plumage
SANDERLING



PECTORAL SANDPIPER



WILSON'S SNIPE

Summer and Winter Plumage
DOWITCHER

Summer and Winter Plumage
KNOT

SANDERLING (Crocethia alba)

Range: Breeds from Melville Island, Ellesmere Island, and northern Greenland to Point Barrow, Alaska, Iceland, and in northern Siberia; winters from central California, Texas, Virginia, and Bermuda to Patagonia, Hawaii, and warmer parts of old world.

Characteristics: The Sanderling breeds on the far-away Arctic Coast, and in early fall begins its wanderings southward. These take it pretty much over the known world. Even the Hawaiian Islands, more than 2,000 miles from the bird's nearest breeding grounds, are not too remote to attract it.

The Sanderling is well named "Beach Bird," for sandy beaches are its favorite places of resort. No prettier sight can be imagined than a flock of these little white birds when busily engaged hunting for food. As the foam-topped breakers rush up the beach, and retreat to gather force for another dash, they plough up the sand, and expose for a few brief seconds multitudes of sand fleas and minute shellfish. These are the chosen food of the Sanderlings, and to gather their harvest they keep pace with the progress of the waves, now advancing, now retreating, ever ready to snatch any hapless creature less nimble than they.

Sanderlings fly in small companies, and often a few individuals mingle with flocks of larger species. Though naturally so tame and unsuspicious as hardly to recognize the presence of man, they associate in such small numbers that they are not greatly exposed to slaughter by the sportsman.

WILSON'S SNIPE (Capella gallinago delicata)

Range: Breeds from northwestern Alaska, northern Mackenzie, central Keewatin, and northern Ungava, south to northern California, southern Colorado, northern Iowa, northern Illinois, Pennsylvania, and New Jersey; winters from northern California, New Mexico, Arkansas, and North Carolina to Colombia and southern Brazil.

Characteristics: Wilson's Snipe is a bird of fresh-water swamp and meadow, in which it finds concealment among the grass or grassy tussocks. It is particularly fond of places where the soil is boggy enough to permit probing with its sensitive bill, for it finds much of its food beneath the surface in the shape of succulent worms. Owing to the nature of its haunts and its secretive habits, the Snipe is familiar to but few outside the guild of sportsmen. Even Nature lovers know the bird chiefly by its sharp "scaip, scaip," as it flushes suddenly from among the grasses. So quickly does the Snipe get under way that one is apt to catch only a glimpse of a brown and black body as it cuts the air on powerful wings with many a twist and turn. It is this peculiar flight that endears the Snipe to the sportsman, since a steady hand and a quick eye are needed to stop the bird.

Under the protection of the Migratory Bird Treaty spring shooting has ended and, although much prized as a game bird, these snipe, appear to have a secure future, although drainage has taken a vast acreage of marshes.

PECTORAL SANDPIPER (Pisobia maculata)

Range: Breeds on the Arctic coast from northern Alaska to mouth of Yukon and northeastern Mackenzie; winters from Peru and Bolivia to northern Chile, Argentina, and Patagonia.

Characteristics: The "Grass Bird," or "Krieker," does not share the predilection of many of its relatives for the sea beach but prefers mud flats and marshes. In late fall the grass on the salt-water marshes is high enough to hide the Krieker, and yet not offer resistance to its progress, and it is surprising how difficult it is to see one as it stands motionless watching the enemy with unalarmed eyes. This Sandpiper arrives on the Bering Sea coast to breed in May, and Nelson's account of its song will surprise those who know the species only when migrating. Speaking of a night passed in the Yukon delta, he says: "As my eyelids began to droop and the scene to become indistinct, suddenly a low, hollow, booming note struck my ear. Again the sound arose nearer and more distinct, and with an effort I brought myself back to the reality of my position and, resting upon one elbow, listened. A few seconds passed and again arose the note; a moment later and, gun in hand, I stood outside the tent. Once again the note was repeated close by, and a glance revealed its author. Standing in the thin grasses 10 or 15 yards from me, with its throat inflated until it was as large as the rest of the bird, was a male *A. maculata*. The note is deep, hollow, and resonant, but at the same time liquid and musical."

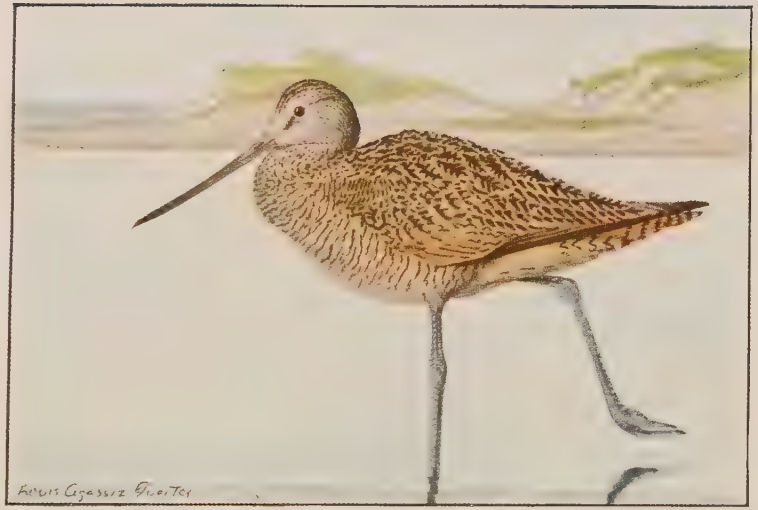
DOWITCHER (Limnodromus griseus and subspecies)

Range: Breeds on the Arctic barrens from Alaska eastward; winters from the southern United States to South America.

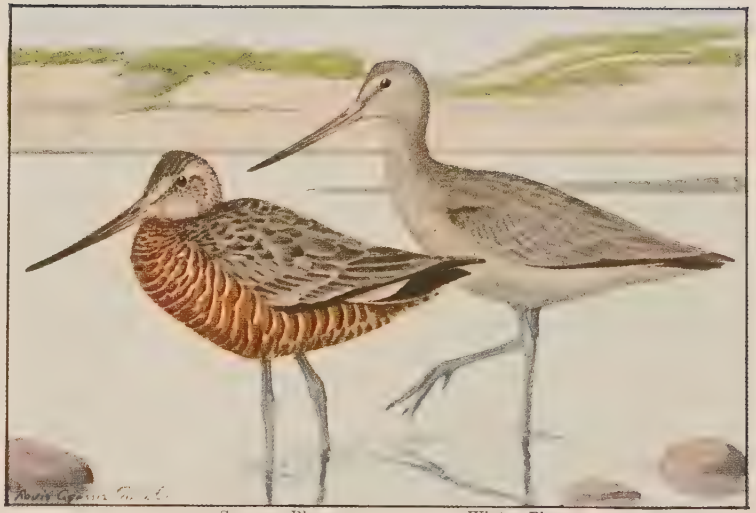
Characteristics: The Dowitcher, or Brown-back, as it is known in many places, is one of our most important shore birds, by reason of its great numbers, its excellence for the table, and the sport it furnishes. If we include under the name "Dowitcher" the Western form, with its longer bill and other slight differences, the bird may be said to visit all parts of the United States in its migration. It is, however, far more common on the coast than in the interior, and formerly it visited the Atlantic shore in multitudes. The Brown-back, however, is one of the most unsuspicious of our shore birds, and comes to wooden decoys with the utmost readiness. Even after a flock is decimated and the dead and dying cover the ground, the survivors will return to the fatal spot.

With others of the family of waders, a continuous closed season has been on these birds for some years under the Federal Migratory Bird regulations. This is the only way its future could be safeguarded. It is hoped thus to restore their sadly depleted numbers and save this handsome game bird.

For biography of KNOT, see page 176.

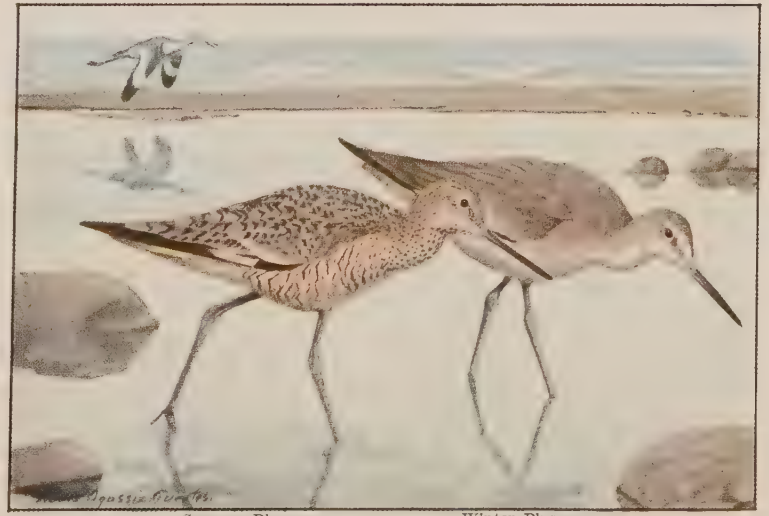


MARBLED GODWIT



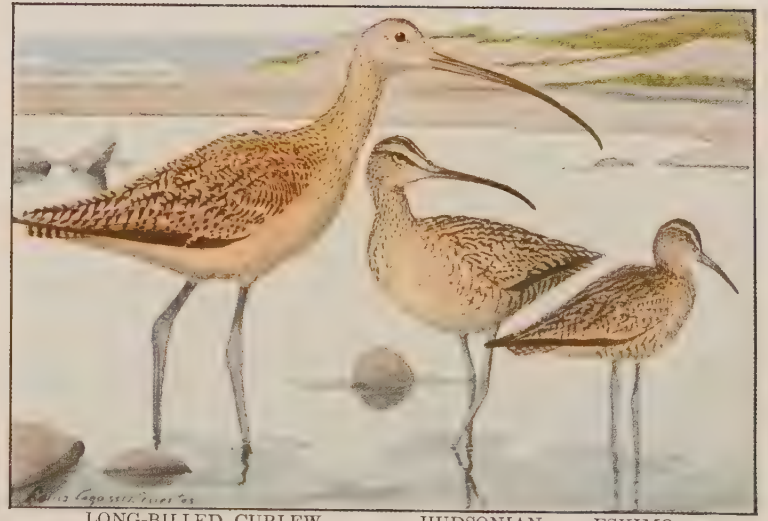
Summer Plumage Winter Plumage

HUDSONIAN GODWIT



Summer Plumage Winter Plumage

WILLET



LONG-BILLED CURLEW HUDSONIAN CURLEW ESKIMO CURLEW

MARBLED GODWIT (Limosa fedoa)

Range: Breeds from valley of Saskatchewan south to North Dakota; winters from southern Lower California, Louisiana, Florida, and Georgia to Guatemala and Belize.

Characteristics: The Marbled Godwit, one of the largest and finest of American shore birds, formerly nested in Nebraska and Iowa. A few may still breed in North Dakota, but the bulk of the species retires beyond our northern boundaries to rear its young. Though in summer an inhabitant of the interior prairies and marshes, the Marbled Godwit prefers to winter on the seacoast, and Cooke notes the remarkable fact that it "presents the unique spectacle of a bird breeding in the middle of the American Continent and migrating directly east and west to the ocean coasts."

While it is easy to prove that the Marbled Godwit formerly was much more abundant than it is now, it is doubtful if the bird ever existed in numbers comparable to the Curlews and various Sandpipers. Wherever it was found, the bird carried with it its own death warrant in its large size, excellent flesh, and its trusting disposition, which not only made it easy to decoy but prompted it to return once and again at the call of wounded comrades. Strict observance of the Federal regulations may possibly save the Marbled Godwit from extinction.

WILLET (Catoptrophorus semipalmatus and subspecies)

Range: Breeds from Maryland, southern Manitoba, Alberta and central Oregon south to Florida, Bahamas, coast of Louisiana and Texas, central Colorado and northern California; winters from the southern border of the United States to South America.

Characteristics: The Willet, including under this name both the Eastern and the Western forms, ranges widely over the United States and formerly bred in suitable localities over much of our territory. On the Atlantic it nested from Nova Scotia to the Gulf of Mexico, and probably small numbers yet nest on some of the sandy islands southward. At first thought it may seem strange that a bird so abundant and so widely distributed as the Willet should have been so reduced in numbers, but the real wonder is that any remain after the treatment the species has been subjected to. The bird is wary enough and when alarmed informs the whole neighborhood by its loud outcries, yet as the result of being shot in season and out of season the species has at length been brought within measurable distance of the end. This statement applies more particularly to the Eastern bird. The Western bird has fared better, and in fall many of the latter visit the Atlantic coast.

The process of exterminating our Eastern Willet was accelerated along the coast by the quite uniform practice of robbing the nests for the large and palatable eggs. However, the continuous Federal closed season on these attractive birds is having its effect in their increased numbers. Under protection they have become very unsuspicious and to permit a renewed open season would have deadly results.

HUDSONIAN GODWIT (Limosa hæmastica)

Range: Breeds from the lower Anderson River southeast to central Keewatin; winters in Argentina and the Falkland Islands.

Characteristics: Nothing less than two continents suffice to satisfy the roving disposition of the Hudsonian Godwit which, according to Cooke, probably breeds on the barren grounds from the mouth of the Mackenzie to Hudson Bay. The species after leaving our northeast coast probably reaches winter quarters by an all-sea route. On the return journey in spring the Godwit reaches Texas in April, and proceeds up the Mississippi Valley, thus, in a general way, duplicating the route of the Golden Plover.

The Hudsonian Godwit has been greatly aided in its struggle with fate in the shape of merciless sportsmen by the fact that its breeding grounds are in a distant and desolate region where its parental duties are little interfered with. Though to-day more numerous than the Marbled Godwit, its destiny is equally sure and almost as imminent. Nothing short of absolute protection for a term of years will save the species from extinction. Under Federal regulations, the Hudsonian Godwit, like some of its relatives, has had the benefit of a continuous closed season for years and is benefiting from it. The perpetuation of these birds depends much on the coöperation of sportsmen who as a class are helping save many of our threatened species.

LONG-BILLED CURLEW (Numenius americanus)

Range: Breeds from central British Columbia, southern Saskatchewan, and Manitoba to northeastern California, northern New Mexico, and northwestern Texas; winters from central California and southern Arizona south to Guatemala, and on Atlantic coast from South Carolina to Florida, Louisiana, and Texas.

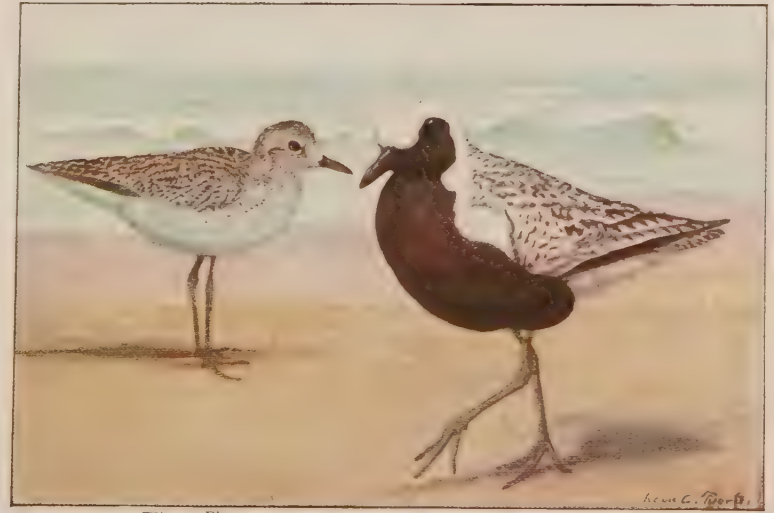
Characteristics: Few in our times have known this big Curlew in the Atlantic States, although a century or less ago flocks of considerable size were not uncommon. Many of us, however, have made the acquaintance of the bird in the Western States, where it breeds, or did breed, from Canada to Texas. Those best acquainted with the recent status of the bird see little hope for it. The natural extension of agriculture has greatly limited its breeding grounds, and for this there is no remedy. Nor should one be desired, since in the mind of every right-thinking citizen farms are more important than breeding grounds for Curlew. Nevertheless, the Curlew is not an over-shy bird, and, if left undisturbed during the breeding season, would long survive in its old haunts, since it has increased of late years under a continuous closed season.

Its flesh is rather tough and dry, and where it subsists on marine life is too strong to be palatable. As the bird eats many insects and crawfish, we may plead its utility as an additional argument in its favor.

For biographies of HUDSONIAN and ESKIMO CURLEWS, see pages 175 and 176.

GREATER YELLOWLEGS LESSER YELLOWLEGS

Male Female
RUDDY TURNSTONE BLACK TURNSTONE (Top



Winter Plumage Spring Plumage
BLACK-BELLIED PLOVER

Winter Plumage Summer Plumage
GOLDEN PLOVER

GREATER YELLOWLEGS (Totanus melanoleucus)

Range: Breeds from Lake Iliamna, Alaska, and southern Mackenzie to southern British Columbia, Ungava, Labrador, and Anticosti Island; winters from southern California, Texas, Louisiana, and Georgia south to Patagonia.

Characteristics: The Yellowlegs is one of the largest and most conspicuous of our shore birds, and, though greatly reduced in numbers, is still comparatively abundant. Like many other shore birds, its numbers vary locally and with different years, such fluctuations being chiefly due no doubt to favorable and unfavorable breeding seasons in the far north. On the Eastern coast the Yellowlegs has learned that flight over the sea to its winter quarters in South America is safer than an all-land route where expectant gunners beset the shores.

The bird has a loud and mellow call note which is easily imitated and is often employed in connection with wooden decoys to lure a flock within range of the deadly shotgun. Experience, however, soon teaches the Yellowlegs to be shy and suspicious, and its long neck and still longer legs eminently fit it for the post of watchman in a flock of shore birds. For our big wader has a most friendly disposition, and associates on the closest terms with other members of the long-legged fraternity, both large and small. Hence among them its loud call has come to be recognized as a warning of danger.

AMERICAN BLACK-BELLIED PLOVER (Squatarola squatarola cynosura)

Range: Breeds from Alaskan coast of Bering Sea to Boothia and Melville Peninsulas; winters from California, Louisiana, and North Carolina to Brazil and Peru.

Characteristics: The "Beetle-head" bears a rather close superficial resemblance to the Golden Plover, with which it sometimes associates, but the sportsman with quarry in hand can instantly distinguish them by a glance at the toes. If there are three toes in front and one behind, his bird is the Beetle-head. The Golden Plover has only three toes. Like the Golden Plover, the Beetle-head breeds in Arctic lands, but unlike that bird it uses practically the same fly lines summer and fall. It inhabits both the Atlantic and Pacific coasts and also a wide strip of the interior, including the Mississippi Valley.

The Black-belly was formerly very abundant over most of its range, but suffered a marked decrease during the past 50 years. The supply of these birds under Federal protection has continued so well it is hoped that the present continuous closed season will rapidly increase their numbers. If sportsmen and others interested will lend their coöperation, a really effective enforcement of protective regulations, not only in favor of the present species, but of shore birds generally, can be more readily maintained.

For biographies of LESSER YELLOWLEGS and BLACK TURNSTONE, see pp. 176-177.

COMMON TURNSTONE (Arenaria interpres and subspecies)

Range: Breeds on Arctic tundras from Alaskan coast of Bering Sea to Melville Peninsula, and north to Melville Island; winters from California, Texas and South Carolina to Brazil, Chile, and the southern coasts of Asia and in Oceanica.

Characteristics: The curious little Turnstone or "Calico-back" differs in many respects from other shore birds. It has a short stout bill, short stocky legs, and a vigorous compact body, and this unusual combination enables it to perform stunts unknown to shore birds generally. Thus it obtains no inconsiderable part of its food by prying over stones, shells, or sods with its bill, for the purpose of securing the small insect life that lurks underneath. Forbush states that formerly the Turnstone was of much economic importance along the New England coast, where it was known to gunners as "Chicken Plover," and was shot in great numbers. This Turnstone is notable as being one of the first shore birds to figure in protective measures, being protected at night under a Massachusetts law passed in 1835, together with the Plover, Curlew, and Doughbird. Though enjoying legal protection, as the phrase goes, the bird was little protected in fact, as results show. It is true that the species has lasted till now, but it has become comparatively uncommon. Its existence to-day is due less to the protection it received in the past than to the inaccessibility of its breeding grounds in the far north.

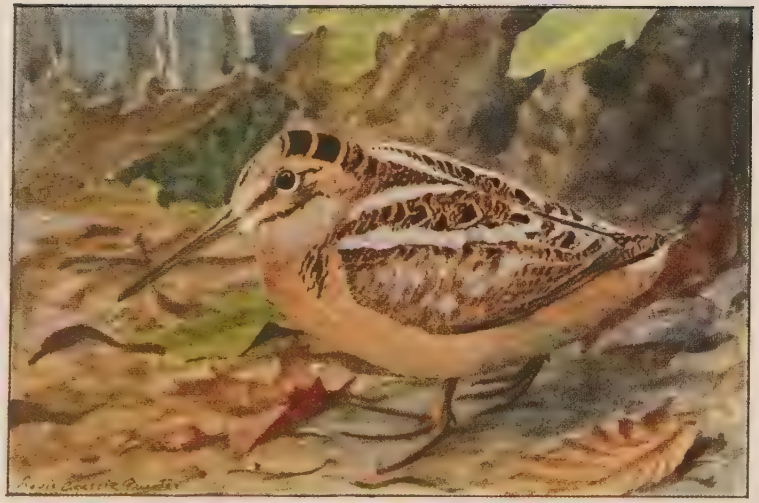
GOLDEN PLOVER (Pluvialis dominica and subspecies)

Range: Breeds from Alaskan coast of Bering Sea along the Arctic coast to mouth of Mackenzie, and from Melville Island, Wellington Channel, and Melville Peninsula south to northwestern Hudson Bay; winters on the pampas of Brazil and Argentina, and on the coasts of the Hawaiian Islands and southeastern Asia.

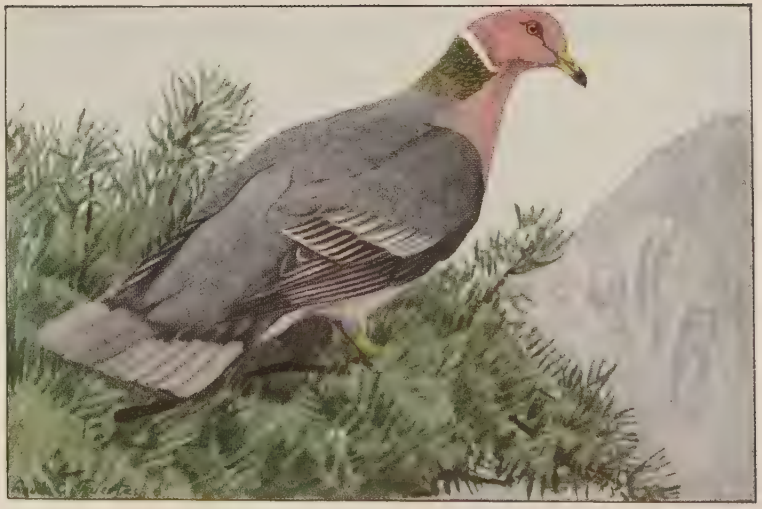
Characteristics: At one season or another the Golden Plover occurs over practically all of the United States and formerly its numbers were enormous. Its migrations are unique among shore birds. When it leaves Labrador it boldly strikes across the ocean and, unless deflected by storms, apparently does not fold its wings until it reaches South America.

So long a flight without resting may seem impossible for a bird as small as this Plover. We know, however, that a close relative, the Pacific Golden Plover, flies from Alaska to the Hawaiian Archipelago, a distance of quite 2,000 miles. While the Atlantic species might stop to rest if it would, the Pacific coast species has no stopping place en route. The former returns in spring by an all-land route, passing up the Mississippi Valley.

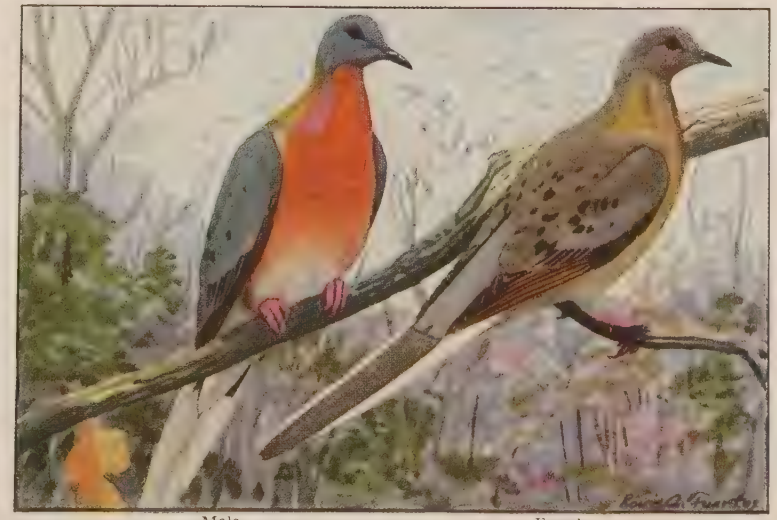
Though protected in fall from sportsmen by the route it follows, spring shooting in the Mississippi Valley depleted the ranks of this Plover to a pitiful remnant of its former numbers. The time has indeed long passed when a party of sportsmen, however large, can kill 48,000 Plover in a day, as Audubon states was done near New Orleans in 1821, and now the question is whether protection during its spring migration comes too late to save the species.



WOODCOCK



BAND-TAILED PIGEON



Male Female

PASSENGER PIGEON

Female Male Male

SPRUCE GROUSE FRANKLIN'S GROUSE

WOODCOCK (Rubicola minor)

Range: Breeds from northeastern North Dakota, southern Manitoba, northern Michigan, southern Quebec, and Nova Scotia south to southern Kansas, southern Louisiana, and northern Florida; winters from southern Missouri, Ohio Valley, and New Jersey south to Texas and southern Florida.

Characteristics: The Woodcock, member of the royal family among game birds, is practically the exclusive property of the United States. It is true that a greater or lesser number of Woodcock cross our northern frontier to breed, but the bulk of the species never leaves our borders. As a prerequisite to its presence the Woodcock requires soft, moist earth in which to probe for earthworms.

Study him at what season you will, meet him where you may, the Woodcock is always an interesting bird. His spring-flight song, given as the hours of darkness approach—for the Woodcock is chiefly of nocturnal habits—is unique among the long-billed, long-legged fraternity, and the many details connected with his housekeeping are well worth attention. And what music so sweet to the sportsman's ears as the silvery whistle of the Woodcock's wings when the bird, suddenly roused from his snug shelter beneath bush or bracken, mounts upward through the silver birches! Nor is any other prize among game birds so dear to the sportsman's heart as this many-hued denizen of swamp and hillside when brought to bag in fair, sportsmanlike fashion. All the more keenly then must sportsman and bird lover regret the fact that the Woodcock is passing. Spring and summer Woodcock-shooting should be abolished.

PASSENGER PIGEON (Ectopistes canadensis)

Range: Bred formerly from middle-western Mackenzie, central Keewatin, central Quebec, and Nova Scotia south to Kansas, Mississippi, Pennsylvania, and New York; wintered principally from Arkansas and North Carolina south to central Texas, Louisiana, and Florida.

Characteristics: In the Zoölogical Gardens of Cincinnati, Ohio, on September 1, 1914, aged 20 years, departed this life the sole surviving Passenger Pigeon. This brief obituary records the disappearance from earth not only of the last survivor of a notable American game bird, but, what is infinitely sadder, the passing of a species. The history of the Passenger Pigeon from the first settlement to and including our own times reads like a romance, but a romance tinged on every page with man's cruelty, rapacity, and shortsightedness. Wood's account of the Passenger Pigeon (1629-34) is so quaint that I subjoin part of it:

"These Birds come into the Countrey, to goe to the North parts in the beginning of our Spring, at which time (if I may be counted worthy to be believed in a thing that is not so strange as true) I have seene them fly as if the Ayerie regiment had beene Pigeons; seeing neyther beginning nor ending, length or breadth of these Millions of Millions."

Audubon states that he rode through a winter roosting-place in Kentucky which was more than 40 miles long and 3 miles wide. It may be doubted if in the prime days of this Pigeon its numbers were ever equaled by any other bird, either in the Old World or the New. Only its great numbers enabled it to survive the assaults of its enemies as long as it did. Then came the market netter, and everywhere the hapless Pigeons were taken in season and out of season, with eggs in their bodies ready for the nest and with nests full of young.

BAND-TAILED PIGEON (Columba fasciata and subspecies)

Range: Breeds from southwestern British Columbia, western Washington, western Oregon, northern Utah, and north-central Colorado south through southwestern United States and Mexico to Nicaragua, and east to western Texas; winters from southwestern United States southward.

Characteristics: Though bearing no very close resemblance to the Passenger Pigeon, the Band-tail may be said to represent that bird on the Pacific coast. Like the Pigeons generally, the Band-tails are sociable, and flocks of hundreds used to be common in the oak groves of southern California.

They are extremely fond of acorns, and although of late years persecution has made them wary they will risk much to obtain their favorite food. When they find a well-laden oak tree they will swallow acorns, shells and all, till they are full to the very bill.

Vernon Bailey found them nesting in the Guadalupe Mountains, Texas, as late as August. Their note in the breeding season is a hoot singularly like an Owl's, but most of the year they are silent. On the West coast for years they have been persistently hunted, and as they breed in the mountains, which are much resorted to by summer campers, the limits of the closed season were by no means always observed. A continuous closed season on these birds for years under the Migratory Bird Treaty has brought them back abundantly in many places.

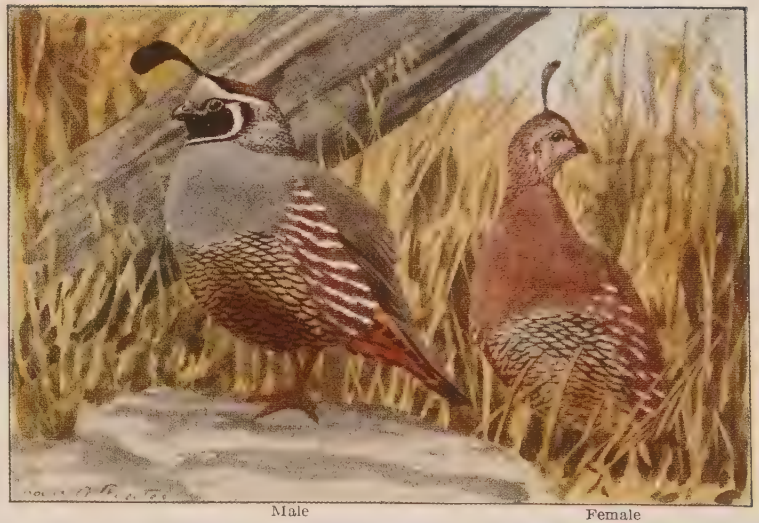
SPRUCE GROUSE (Canachites canadensis and subspecies)

Range: From Alaska and the Mackenzie Valley south to northern Maine, New York, and Michigan.

Characteristics: The history of the Spruce Partridge for many places must be in the past tense. It used to be common in Michigan, the Adirondack region of New York, and in northern New England, but in all three districts is now much less numerous than formerly. The unsuspicious nature of this Grouse and its total obliviousness to danger from human beings probably had more to do with its sad end than anything else. It is said that when a flock was surprised in trees, one after another could be shot down till the last one was gone. As the Grouse is practically nonmigratory, its preservation depends solely on the States in which it lives.

For biography of FRANKLIN'S GROUSE, see page 163.

MOUNTAIN QUAIL

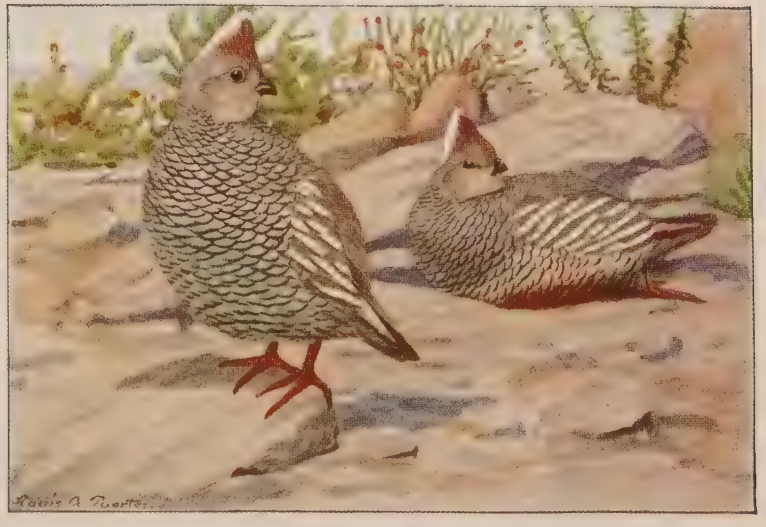


Male Female

VALLEY QUAIL

Female Male

GAMBEL'S QUAIL



SCALED QUAIL CHESTNUT-BELLIED SCALED QUAIL

MOUNTAIN QUAIL (**Oreortyx picta** and subspecies)

Range: Pacific coast from southern Washington south to northern Lower California.

Characteristics: All our American Quail are beautiful, but this superb denizen of the mountain sides bears away the palm. Its elegant form, rich coloration, its long, nodding black plumes, its brown gorget, and its alert carriage lend the bird an air of rare distinction. Our plumed knight loves not the low country with its dry watercourses, its heat and dust, but chooses for his permanent home the mountain valleys and hillsides with their pure air and numerous streams. This Quail, with its two varieties, is strictly limited to the West coast. Formerly it was abundant over most of its range, and it is yet numerous in many localities. In Oregon it used to be trapped in great numbers, and as long ago as 1880 was commonly exposed in the city markets in crates containing 20 or more. Even the market men decried the practice; nevertheless they cheerfully sold the birds at $3 per dozen. A sad sight it was to see these captive creatures exposed for sale.

My own experience with the Mountain Quail dates back many years. All the coveys I saw in California and Oregon were comparatively small, always less than 10, and the bird appears rarely, if ever, to associate in great gatherings composed of several or more independent coveys, as does the Valley and Gambel's Quail. When in their ordinary mountain haunts, plumed Quail are tame enough, altogether too tame for their own safety, but I am told that where much pursued they learn to take care of themselves.

GAMBEL'S QUAIL (**Lophortyx gambeli** and subspecies)

Range: Desert region of southern California, southern Nevada, Arizona, and southwestern Utah, east to southwestern Colorado; also in southwestern New Mexico to the Rio Grande Valley and the El Paso region of extreme western Texas, and south into northeastern Lower California and to southern Sonora.

Characteristics: Though differing markedly in coloration from the Valley Quail of the Pacific coast, Gambel's Quail so closely resembles that bird in size and general habits that in my mind the two are inseparable. That the Quail themselves are misled by the likeness would appear from the fact that the two readily hybridize.

This Quail prefers cañon bottoms and rocky hillsides for hunting grounds, and the speed with which the individuals of a frightened covey can make good their escape among rocks and bushes is surprising. Gambel's Quail trusts for safety first to its legs and only secondarily to its wings, while it is rare indeed that it resorts to Bobwhite's favorite ruse of close hiding. Ordinarily in fall it associates in large bands—they can scarcely be called coveys, since they are the aggregate of many coveys—and under these circumstances the pot hunter who cannot slay his scores must indeed be a bungler. Gambel's Quail is no stranger in vineyard and garden, although for the most part it frequents scantily inhabited districts. Both Gambel's and the California Valley Quail roost in trees and thick undergrowth, where they are safe from most prowlers of the darkness.

VALLEY QUAIL (**Lophortyx californica** and subspecies)

Range: Pacific coast region from southwestern Oregon south to southern Lower California; introduced into Vancouver Island, Washington, and Colorado.

Characteristics: The two forms of Quail inhabiting the coast and valley regions of Oregon and California, though differing enough in plumage to constitute subspecies, are very similar in habits. As its name implies, the bird prefers valleys to mountains, although it may range upward as high as 4,000 feet, where it meets the habitat of its larger relative, the Mountain Quail.

The Valley Quail is widely distributed, and being very prolific, it is, or was, exceedingly abundant over most of its range. Eastern sportsmen, knowing only our Bobwhite, would find it difficult to credit tales of the numbers of Valley Quail that formerly congregated in favorable localities. Flocks of more than 200 were common enough, but in the late seventies and eighties I have occasionally seen several thousand assembled near water. When flushed, successive bands of hundreds rose simultaneously with an extraordinary whir of wings, and the air was filled with their flying forms. Such sights are of the past, although the Valley Quail is still numerous in many regions. It is on good terms with civilization and is prone to frequent cultivated tracts, especially vineyards and gardens, even on the outskirts of populous towns. Its fondness for grapes does not endear it to the vine grower, who often has to resort to extreme measures to protect bunches of ripe fruit.

SCALED QUAIL (**Callipepla squamata** and subspecies)

Range: From central Arizona to western Texas, north to southern Colorado and over most of Panhandle of Texas, east nearly to central Texas, and south to Valley of Mexico.

Characteristics: The Cottontop, as the Scaled Quail has been dubbed from its conspicuous whitish crest, has a restricted range in the United States along our southern border. The country it frequents is dry and barren, and chaparral and mesquite form its favorite cover. On account of the dry nature of Quail's food they are greatly dependent upon water, and hence the presence of large numbers of Cottontops may be taken as a pretty sure indication that a stream or waterhole is not far away. Western Quail of whatever species have learned to trust to their legs rather than their wings to carry them out of harm's way, and the Cottontop forms no exception to the rule. When alarmed, a bevy will scatter hither and yon among the rocks or brush, to come together again when the supposed danger is past. When hard pressed it is an adept at close hiding. The bluish-gray plumage of the Cottontop harmonizes well with its usual surroundings and no doubt the confidence the bird reposes in its protective coloration is justified by long experience. Protected by the remoteness of its desert home this Quail should long survive.

The habits of the Chestnut-bellied Scaled Quail are so similar to those of the present species as not to call for separate mention.

RUFFED GROUSE

BOBWHITE

RUFFED GROUSE (Bonasa umbellus and subspecies)

Range: Wooded region of Alaska, Canada and United States, south to eastern Kansas, northern Arkansas, Tennessee, and Virginia, and in the Alleghenies to northern Georgia.

Characteristics: This, the Partridge of the Northern woods, the Pheasant of the South, may well be termed the prince of American game birds. Its high position, however, is likely soon to be vacant and its place taken by some lesser member of the game bird galaxy unless vigorous efforts are made to check its decrease. Possessed of a vigorous constitution which enables the bird to brave the northern winter and defy all ordinary vicissitudes of weather, vigilant and shy where much persecuted, strong of wing and skilled in many a wile by means of which to elude the sportsman and his keen-scented dog, our Partridge is well equipped to make a brave fight for existence. And how bravely has it faced its fate!

Though usually a resident of extensive forested tracts it is amazing how long the Ruffed Grouse will continue to live in leafy swamps of a few acres, or on little wooded islands, mere relics of its former forested domain. Gun and dog, natural diseases, sleety storms, and unfavorable breeding seasons are most potent for harm. The intense and active interest taken during recent years by sportsmen in solving the causes of diseases and other influences affecting these birds is a good augury of its future protection. It is nonmigratory, and hence only the States in which it lives can perpetuate it.

That the bird can be propagated in confinement is much in its favor, and a little of the money spent in attempts to introduce foreign game birds would go a long way toward rehabilitating the Partridge. No sound that echoes through our woods has quite the effect on the wayside stroller as does the martial summons of the Ruffed Grouse, and it will be thrice a pity if future generations must miss the spring and fall roll call of this woodland drummer (see illustration, page 67).

BARROW'S GOLDEN-EYE (Glaucionetta islandica)
(See illustration, page 140)

Range: Breeds from south-central Alaska and northwestern Mackenzie to southern Oregon and southern Colorado, and from northern Ungava to central Quebec; winters from southeastern Alaska, central Montana, the Great Lakes, and Gulf of St. Lawrence south to central California, southern Colorado, Nebraska, and New England.

Characteristics: The resemblance which Barrow's Golden-eye bears to the common Whistler is extraordinarily close. The males, as a glance at the illustration on page 140 will show, are easily enough distinguished when close by, but to tell the females and young apart with absolute certainty is impossible. It comes to us as a migrant in the late fall and sojourns along our northern borders, where it is often shot and sent to market with the more numerous common Whistler.

BOBWHITE (Colinus virginianus and subspecies)

Range: Eastern North America from South Dakota, southern Minnesota, southern Ontario, and southwestern Maine south to the Gulf coast, Florida, Cuba, and eastern and southern Mexico.

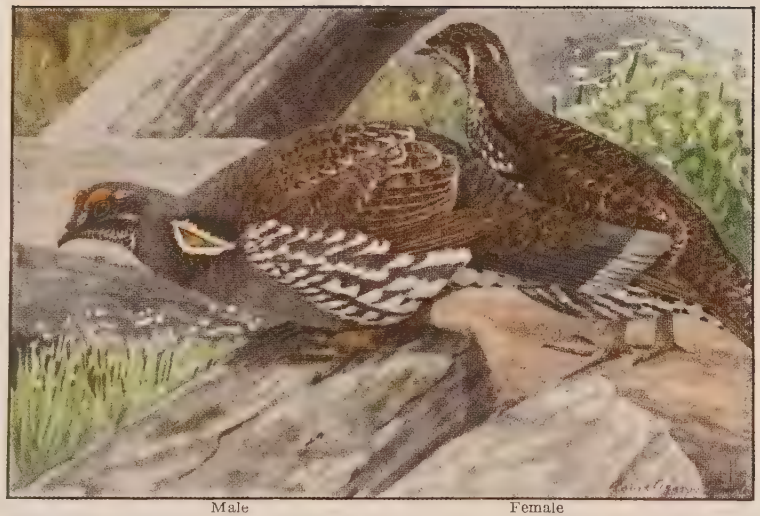
Characteristics: Whatever this little friend of ours says to us in spring, whether "bob-white," as many interpret it, or "more-more-wet," according to the practical farmer, he utters it in such vigorous, albeit mellow tones, that he thereby endears himself to all hearts. And how many there are who, as the promises of spring are fulfilled by opening summer, listen for the cheerful message of this blithe whistler of fence post and thicket and are made happier when they hear it.

And "Bobby" is no recluse of the thick woods. He loves the brier patch, the brown stubble, and the open, weedy field. The bright sunlight shines for him, and his loud, cheery call is sounded from some vantage point in the open as if he would have all the world hear his challenge to produce anything more beautiful than his little brown mate snugly hidden away near by. Long may his cheery whistle sound through the land. There is no reason why it should not, save the too ardent zeal of the sportsman and the greed of the epicure. Bobwhite is prolific, knows pretty well how to take care of himself, and, if need be, can be reared in captivity. The fate of Bobwhite, as of some other nonmigratory game birds, rests solely with the several States within which he dwells. Unquestionably, in most States, the present bag limit is altogether too high and should be materially reduced. The farmer, too, should have a word to say, since the food of Bobwhite, consisting largely of harmful beetles, worms, and weevils, is such that he cannot afford to permit unlimited Quail-shooting over his farm, but should jealously guard his coveys and be sure that enough pairs are left to insure the future of the species.

FRANKLIN'S GROUSE (Canachites franklini)
(See illustration, page 158)

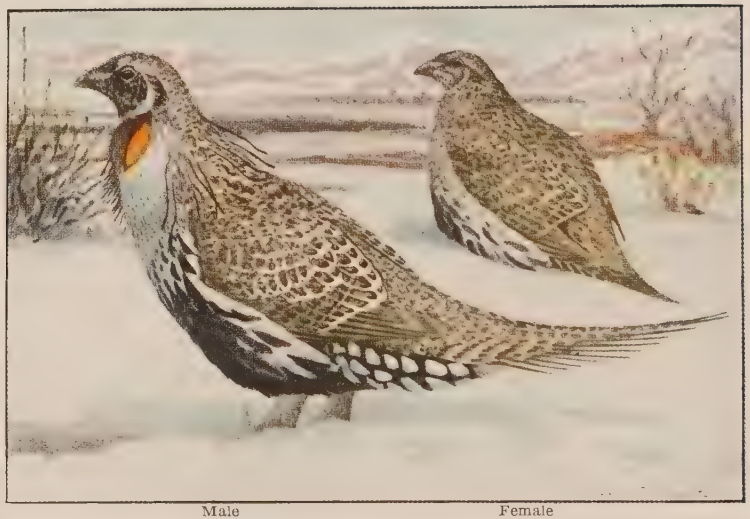
Range: Southern Alaska, central British Columbia, and west-central Alberta south to northern Oregon, central Idaho, and western Montana.

Characteristics: Franklin's Grouse was first described by Lewis and Clarke who saw it in Idaho while on their memorable trip to the Pacific coast. While thus known for more than a century, surprisingly little has been recorded concerning its mode of life. From the close similarity it bears to the Spruce Partridge of the East, it no doubt possesses very similar habits. At least it has the same confiding disposition as that bird, as is attested by the fact that its habit of standing in amazed curiosity to watch the movements of an approaching foe intent on its destruction has earned it the contemptuous epithet of "Fool Hen" (see also Dusky Grouse). Like our Ruffed Grouse, this bird is a drummer, but instead of sounding the roll from rock or log, the male drums, according to Dawson, by rapidly beating the air with his wings as he slowly sinks from some elevated station or mounts upward to it.



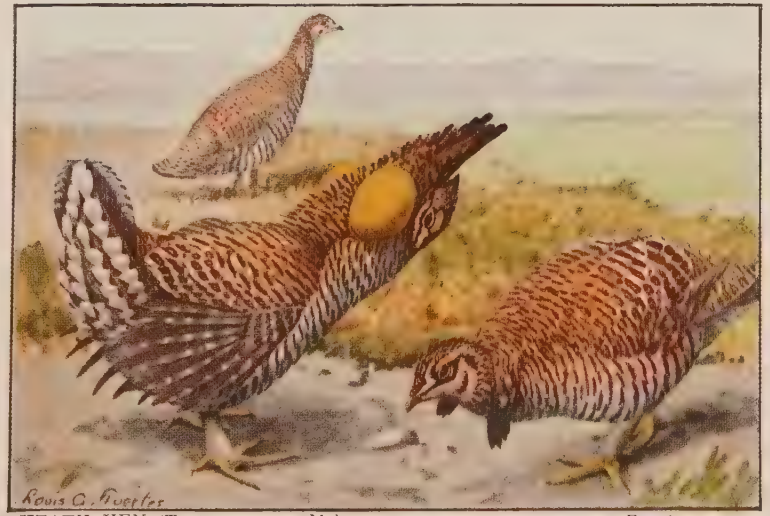
Male Female

DUSKY GROUSE



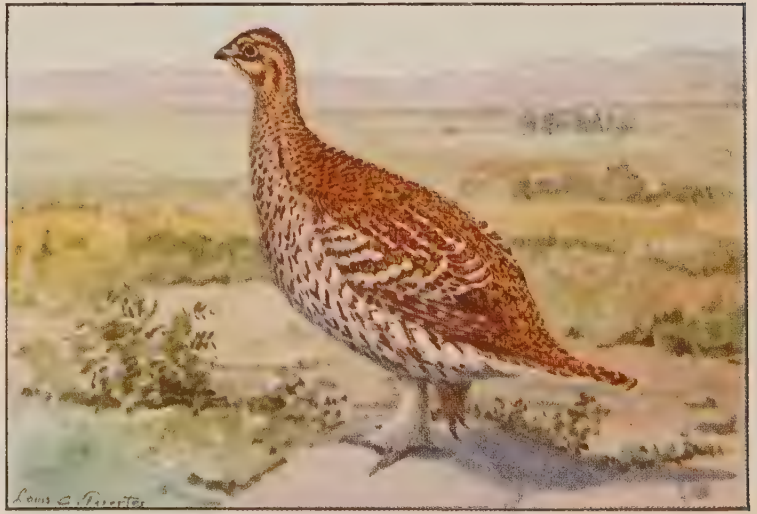
Male Female

SAGE HEN



HEATH HEN (Top) Male Female

PRAIRIE CHICKEN



SHARP-TAILED GROUSE

DUSKY GROUSE (Dendragapus obscurus and subspecies)

Range: Rocky Mountain and Pacific coast region from Upper Yukon and Mackenzie rivers south to mountains of California and central Arizona.

Characteristics: This large and beautiful Grouse affords an excellent illustration of the effect of the gun on the disposition and habits of a game bird. An inhabitant of the mountains and too small to be much hunted by the Indians when larger game was so abundant, this Grouse in early days exhibited the extreme of tameness and indifference. I have many times seen parties of from six to a dozen that scarcely took the trouble to move out of the trail, so entirely unconscious of danger were they and so curious as to the errand of the intruder. Under such circumstances, when alarmed by a gun the flock is apt to betake itself to the nearest trees and sit motionless on the branches, evidently believing themselves to be invisible. The term "Fool Hen," by which they are known, rather aptly describes their conduct and demeanor on such occasions.

Even the "Fool Hen," however, can profit by experience, and the lesson of caution once learned, it is as shy as it previously was tame. Its flesh is delicious eating and the mountain camper rarely loses an opportunity to feast on it. In spring the loud and sonorous hooting of the Grouse, coming from some giant pine in ravine and cañon, can be heard for long distances, and has such marked ventriloquial effect that it is difficult to locate the boomer.

HEATH HEN (Tympanuchus cupido)

Range: Marthas Vineyard, Massachusetts.

Characteristics: So late as the first year of the present century the Heath Hen was still more or less common in the Middle and Eastern States. Still earlier the bird was probably rather generally distributed over the territory east of the Alleghenies. We have no reason to be proud of the course taken by legislation in favor of the Heath Hen, though we need not go back to the last century for even more flagrant examples of the failure of protective legislation. First, as is usual in such cases, all legislation halted till the bird was well on the road to extinction. Then laws were passed, adequate enough, if properly enforced; but they were openly ignored or repealed or modified no doubt under the time-worn arguments of the present day: the importance to sportsmen of an open season; the need for meat; with the corollary, that the species at that particular period was in no danger. And the result was the same as in the case of the Passenger Pigeon, and as it will be soon in the case of the Prairie Chicken.

Marthas Vineyard, Massachusetts, now holds the last pitiful remnant of this fine game bird which, under the protection of the State, increased from a few couples to several hundred, but in 1927 they had again decreased to a few individuals. How long this forlorn band of survivors will be able to hold fate at bay remains to be seen.

SAGE HEN (Centrocercus urophasianus)

Range: Sagebrush plains from middle-southern British Columbia, southern Saskatchewan, and northwestern North Dakota to middle-eastern California, northwestern New Mexico, and northwestern Nebraska.

Characteristics: To make the acquaintance of the Sage Hen, the largest of the Grouse family in the United States, one must leave the region of forests and greenery and betake himself to the barren plains country where grows in abundance the Artemisia, or sagebrush. This aromatic plant furnishes the bird not only safe cover but also food. Indeed, sage leaves constitute such a large part of the regular fare of the old birds that their flesh becomes strongly tainted, and he must be hungry indeed who relishes it. The flesh of the young, however, is excellent.

Owing to its large size and its tameness the Sage Hen, which formerly was popularly known as Cock of the Plains, makes the easiest of marks for the hunter, and unless special attention is given to its preservation the species will become too few to save from extinction.

The yellow air sacs on the neck of the male are inflated to enormous size during the mating season, and together with his curious antics no doubt suffice to render him irresistible to the female. Douglas has described his love-song as a confused, grating, but not offensively disagreeable tone, expressed by *Hurr-hŭrr-hurr-r-r-r-hoo*, ending in a deep, hollow tone.

SHARP-TAILED GROUSE (Pediocætes phasianellus and subspecies)

Range: Central and western North America from Central Alaska and Ungava to northeastern California and Illinois.

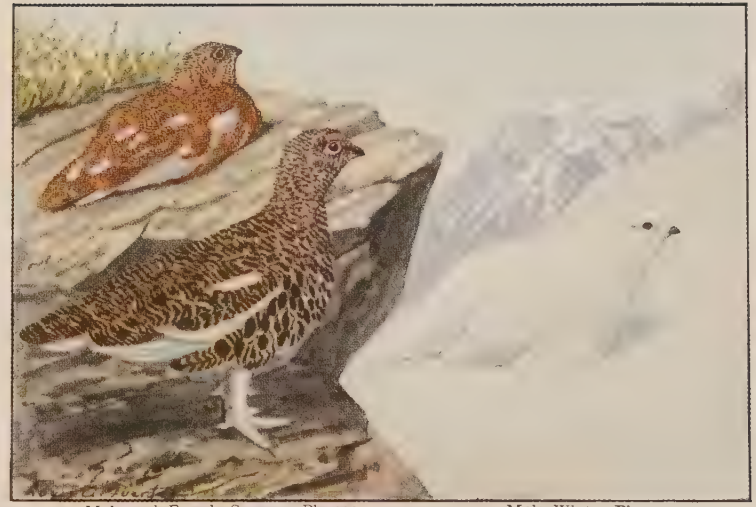
Characteristics: The Sharp-tailed Grouse, including under this name its three forms, has an extensive range in the Far West, but formerly extended far enough eastward to meet the range of the true Prairie Hen (Chicken) (see text, page 177) in Wisconsin and Illinois where, however, it has been nearly if not quite exterminated. As a rule, it inhabited wilder and rougher country than the Prairie Hen, and never was so abundant.

The free use of the shotgun in recent years has taught the Sharp-tail some important lessons, and its wariness, seconded by its powerful wings, is sufficient to insure the perpetuity of the species if the Western States in which it lives, profiting by the sad lesson of the Prairie Chicken and Heath Hen in the East, afford it the needed protection. Unless, however, its pursuit be carefully regulated, its race will soon be run, and another name added to the lengthening list of extinct American game birds.

For biography of PRAIRIE CHICKEN, see page 177.

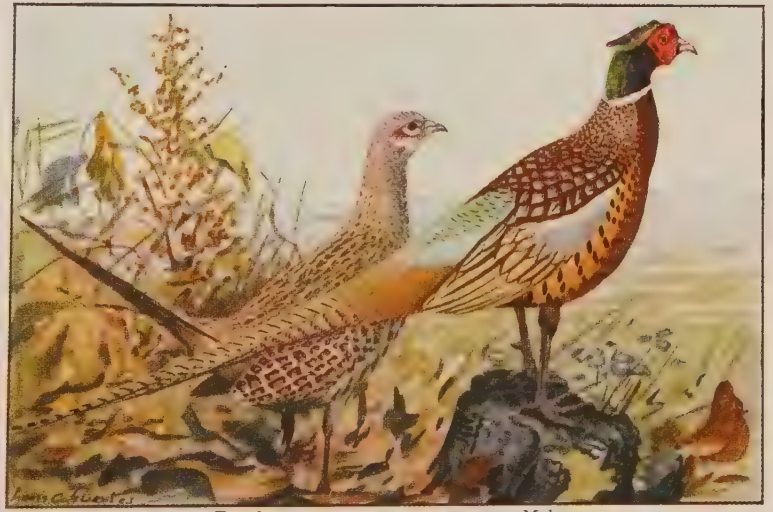
Male and Female Summer Plumage Winter Plumage

WILLOW PTARMIGAN



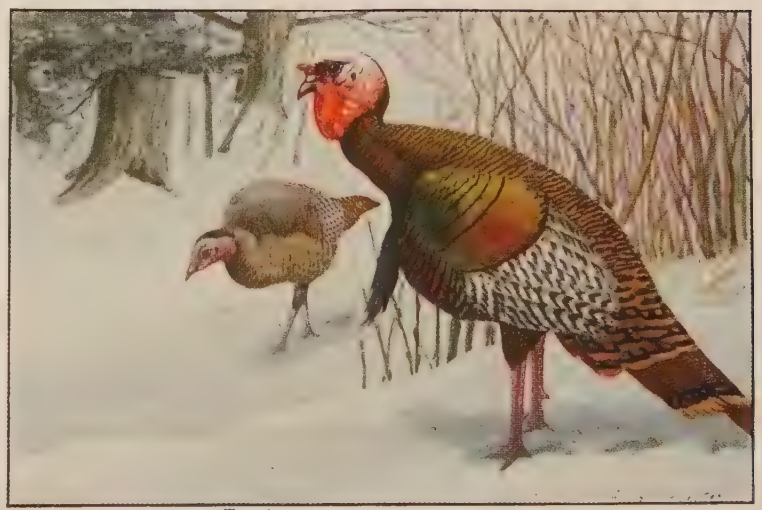
Male and Female Summer Plumage Male Winter Plumage

WHITE-TAILED PTARMIGAN



Female Male

RING-NECKED PHEASANT



Female Male

WILD TURKEY

WILLOW PTARMIGAN (Lagopus lagopus and American subspecies)

Range: Breeds from northern Alaska, northern Banks Land, and central Greenland south to eastern Aleutian Islands, southeastern Alaska, central Mackenzie, central Keewatin, James Bay, and southern Ungava; south in winter to northern British Columbia, Saskatchewan Valley, Minnesota, Ontario, and Quebec.

Characteristics: To make the acquaintance of the Willow Ptarmigan in its chosen home one must visit the open tundras on the borders of Bering Sea and the Arctic coast. Though not known to breed south of Labrador, the bird migrates in winter to the St. Lawrence, and occasionally a straggler crosses our own boundary. In Alaska in autumn Willow Ptarmigan unite in great flocks, numbering thousands, and migrate to the neighborhood of the Yukon, finding there both food and shelter. In winter they are snared and shot in great numbers, often indeed forming the natives' only resource against want and even famine.

The Eskimo take advantage of the habitual low flight of the bird—only a few feet above the surface—to net them in a curious way. Nelson thus describes it: "Taking a long and medium fine-meshed fishing net, they spread it by fastening cross-pieces to it at certain distances; then taking their places just at sunset in early November or the last of October, on a low, open valley or 'swale,' extending north and south, they stretch the net across the middle of this highway, with a man and sometimes two at each cross-piece, while the women and children conceal themselves behind the neighboring clumps of bushes. As twilight advances the net is raised and held upright. Ere long the flocks of Ptarmigan are seen approaching, skimming along close to the snow-covered earth, and a moment later, as the first birds come in contact with the obstacle, the men press the net down, sometimes securing 50 to 60 birds."

RING-NECKED PHEASANT (Phasianus torquatus)

Range: First introduced from China into the United States near Portland, Oregon, in 1881. Now established and resident in British Columbia, Washington, Oregon, Colorado, New York, Massachusetts, Georgia, and other States.

Characteristics: This splendid game bird, a native of China, has been successfully introduced into the United States. From the first the bird throve wonderfully in Oregon, and today it is probably the most abundant game bird in that State. The Pheasant has not escaped censure on the score of its damage to crops, and it is undoubtedly true that it has a keen appetite for corn, peas, grain, and even potatoes. The introduction of a large game bird like the Pheasant into our domains is very different form the introduction of a small species like the English Sparrow. Unlike the damage done by the Sparrow, the mischief of the Pheasant can be checked at any time desired by simply extending the open season. Pheasants, however, are naturally hardy and prolific, and once established need only reasonable protection.

WHITE-TAILED PTARMIGAN (Lagopus leucurus and subspecies)

Range: High mountains of Alaska and British Columbia south along Rocky Mountains to central New Mexico.

Characteristics: This hardy Ptarmigan, including its Rocky Mountain representative, is an inhabitant of the mountain tops above timber line, and here it lives contentedly summer and winter. Having few foes to contend with, and man being only a casual visitor to its fastnesses, it is likely to continue indefinitely its lonely life among frowning rocks and glistening glaciers. Their mottled plumage in summer and their white robes in winter greatly aid the Ptarmigan in their hard struggle for existence, and to some extent at least the birds appear to realize their invisibility. Thus, the members of a flock when surprised will often remain motionless as if depending on their likeness to their surroundings for immunity. Though protected by law, the best protection for the Ptarmigan is its protective coloration and its habitat, so remote from the bounds of the archenemy, man. May they long continue to insure this timid and inoffensive bird immunity!

As is well known, upon the approach of winter the Ptarmigan changes its plumage from a much-mixed dress of rufous, black and white, to a snowy white. The summer dress is very inconspicuous among the vegetation which the bird frequents, while white winter robes render it no less inconspicuous when the earth is carpeted with snow. Such is one of the many ways in which Mother Nature provides for the safety of her wards.

WILD TURKEY (Meleagris gallopavo and subspecies)

Range: Eastern and southeastern United States, west to Arizona and south central Mexico.

Characteristics: America may well be proud of this, the king of all game birds. Wherever found, the Turkey was originally very plentiful, being sufficiently intelligent and wary to hold its own against the Indian and its numerous natural enemies, particularly the wild cat and cougar. As recently as the late eighties I knew of a flock that had ranged for at least 10 years not far from the banks of the Potomac within sight of the Capitol dome.

Nature has furnished the Turkey a pair of stout legs that enable it to range daily over a wide extent of hill and valley in its search for seeds, grasshoppers, insects, and berries. Inclined to trust to its legs when confronted by danger, it either dashes off at full speed or sneaks quietly away through the bushes, although when forced to fly its powerful wings carry it at a rapid rate. It roosts in the tops of huge trees and this habit is a strong factor for safety.

In the seventies I found Turkeys very numerous on the headwaters of the Gila in Arizona, and as they probably never had been hunted they were almost as tame as barnyard fowls.

Photograph by Robert E. Coker

ONE HUNDRED THOUSAND PELICANS ON ONE OF THE GUANO ISLANDS OF PERU (SEE, ALSO, PAGE 170)

For an account of this and similar bird colonies, see "Peru's Wealth-producing Birds," by R. E. Coker, and "The Most Valuable Bird in the World," by Robert Cushman Murphy, in the NATIONAL GEOGRAPHIC MAGAZINE for June, 1920, and September, 1924, respectively.

One might easily have killed a wagonload in a day. To what extent the Aztecs had domesticated the Wild Turkey before the coming of the Spaniard is not known, but undoubtedly it was kept in captivity and had been known to the Montezumas for centuries.

It is interesting to note that the Turkey originally introduced into Europe from Mexico by the Spaniard was a different subspecies from our eastern Wild Turkey. Subsequently the Mexican bird was reintroduced into America, particularly the Eastern States, from Europe. Easily domesticated, our Wild Turkey even more readily drops its acquired habits and reassumes its primitive mode of life. Thus in several of the Hawaiian Islands the forests have been stocked with domesticated birds which, after a season or two, became as wild as ever.

BLUE-WINGED TEAL (Querquedula discors)

(See illustration, page 136)

Range: Breeds from central British Columbia, Great Slave Lake, central Ungava, and Newfoundland south to central Oregon, northern Nevada, northern New Mexico, central Missouri, southern Indiana, northern Ohio, western New York, and Maine; winters from southern British Columbia, Arizona, southern Illinois, Maryland, and Delaware south to the West Indies and South America as far as Brazil and Chile.

Characteristics: Formerly abundant and nesting over much of eastern United States, the Blue-wing still inhabits most of its former range, but is numerous only in the Middle West. Though found west of the Rockies it is there replaced for the most part by the Cinnamon Teal. Its habits may be described in much the same terms as those of its congener, the Green-wing. Like that bird, it also is a lover of fresh-water ponds and streams with grassy banks.

The Blue-wing migrates south early, and Teal shooting in early September in some localities is one of the sporting events of the year. Remarkably fond of wild rice, this Duck is generally regarded as a titbit, and it is at its best when it has fattened on this nutritious seed. Though extremely swift of wing, its speed avails it little in the long run, since it is tame and unsuspicious, decoys well, and is easily approached and potted when feeding in its grassy coverts. The abolition of spring shooting and other protection under the Migratory Bird Treaty has resulted favorably to both the Blue-winged and the Green-winged Teal. Neither are as abundant as in early times but they are still plentiful in many places during the migrations.

CINNAMON TEAL (Querquedula cyanoptera)

(See illustration, page 136)

Range: Breeds in North America from southern British Columbia, southwestern Alberta, southeastern Wyoming, and western Kansas south to northern Lower California, northern Chihuahua, southern New Mexico, and southwestern Texas; winters from southern California, central New Mexico, and southern Texas south to southern Lower California and central Mexico.

Characteristics: Though a stray individual, the Cinnamon Teal is occasionally seen east of the Mississippi, and though the bird is known to breed as far east as western Kansas, the true home and center of abundance of this species is west of the Rocky Mountains. Its favorite resorts in summer are the extensive marshes that surround shallow fresh or alkali lakes. Well within the recesses of these, it selects a dry spot and on it builds its nest. When the young are hatched they are led by the anxious mother to the shelter of the tall tules that surround these inland lakes by a broad strip of dark green, and here they are safe, at least from most four-footed enemies.

Though the Cinnamon Teal summers to some extent in British Columbia, and a greater or lesser number winter south of our borders, as a species the Teal may be said to pass its life within our boundaries. At present it does not receive adequate protection at any season of the year, and in many places large numbers are killed before they can fly. If thoroughly protected during the summer and if reasonably protected at other seasons, the Teal will hold its own indefinitely, or until, in the interests of agriculture, all its marshy fastnesses have been turned into ploughed fields which, fortunately for waterfowl and bird lovers, will not be for many years to come.

EUROPEAN WIDGEON (Mareca penelope)

(See illustration, page 136)

Range in America: Occurs occasionally in winter and in migration from Wisconsin, Michigan, New York, Nova Scotia, Newfoundland, and Greenland south to Nebraska, Missouri, Indiana, Ohio, North Carolina, and Florida, and in Alaska, British Columbia, and California.

Characteristics: In general appearance the European Widgeon rather closely resembles our Baldpate. The males are easily identified, but a rather careful comparison is needed to distinguish the females. For one thing the head and throat of the female European Widgeon are browner than the corresponding parts of our Baldpate. A better distinguishing mark, however, is found in the axillars, or long feathers under the wings of both sexes, as noted by Bangs. In our Baldpate these are white, while in the European Widgeon they are grey. Particular attention is directed to these distinguishing marks, as sportsmen should know the two birds apart, and thus be enabled to record the fact when they bring to bag the European Widgeon. The bird has long been known to occur in our waters, but its presence has been thought to be only casual. Of late years it appears to seek our shores in increasing numbers; at all events it is being reported oftener. This is probably due less to an actual increase of numbers than to the fact that sportsmen are becoming better acquainted with its appearance. The bird may prove to be, as Forbush believes, a permanent resident of North America.

The habits of the European Widgeon while in our waters offer nothing particularly worthy of note, as distinguished from those of our own Baldpate. The call note of the male, Saunders tells us, is a shrill whistling "whe'e-you," whence the local name "Whew Duck."

PELICANS ON THE LOBOS DE AFUERA ISLANDS, PERU (SEE, ALSO, PAGE 168)

Photograph by Robert E. Coker

LESSER SCAUP DUCK (Nyroca affinis)
(See illustration, page 138)

Range: Breeds from Yukon Valley, Alaska, and Fort Anderson, Mackenzie, south to central British Columbia, southern Montana, Colorado (casually), northern Iowa, northern Indiana, and western Lake Erie; winters from southern British Columbia, Nevada, Colorado, Lake Erie, and New Jersey south to the Bahamas, Lesser Antilles, and Panama.

Characteristics: So closely do the two Scaups or Blue-bills resemble each other and so similar are their general habits that, except as regards their distribution, what is said of one applies almost equally well to the other. Like its congener, the Lesser Scaup is prone to associate in immense flocks, and on this account is sometimes called the "Raft Duck." Because of this habit and because it decoys well, this Scaup is a favorite with gunners, and immense numbers are killed every season. Naturally they are not nearly so numerous as formerly, though, everything considered, they still hold their own fairly well. I found the Lesser Scaup abundant in Florida and in the Gulf States in winter in the early seventies, and Chapman thinks they are more southern in their winter distribution than is the Greater Scaup.

This species ranks among our best divers and its food habits, except in the South in winter, are such as to insure it a warm welcome on the table of the epicure. It is very fond of wild rice, and in fall, when the crop of this grain ripens, frequents the inland lakes by thousands, and soon becomes fat on this nutritious diet. In protected waters it is surprising how soon the two Scaups become tame. I have often approached flocks within half a gun shot that were apparently quite indifferent to my presence, and yet elsewhere the same individuals were wary enough to insure their own safety. No doubt the Scaups would readily lend themselves to semidomestication.

RING-NECKED DUCK (Nyroca collaris)
(See illustration, page 138)

Range: Breeds from southern British Columbia to northern California, and from northern Alberta and Lake Winnipeg south to North Dakota, northern Iowa, and southern Wisconsin; winters from southern British Columbia, New Mexico, northern Texas, southern Illinois, and New Jersey south to Porto Rico and Guatemala.

Characteristics: So much alike are the Ring-neck and the Lesser Scaup in size, flight, and general appearance that it is only when the sportsman has bagged his bird that he can fully assure himself of its identity. The Ring-neck is much more uncommon in the Atlantic States than formerly, though Chapman states that in winter it is still abundant on the Florida fresh-water lakes. It is fairly numerous in migration in the Far West in the marshes of large ponds and lakes, and still continues to breed in considerable numbers in Minnesota and North Dakota and perhaps elsewhere in our northern frontier States. I have never seen the Ring-neck in large flocks, so characteristic of the Scaups, and usually have observed it either in small companies consisting exclusively of its own species, or associated in large flocks of other species, and such, I believe, has been the experience of most other observers.

The Ring-neck has no fondness for salt water, but is preëminently a fresh-water species. Like other members of the genus, it is an excellent diver, and where wild celery is to be has, gets its share of the coveted grass. In point of excellence for the table it may be ranked with the two Scaups, but does not equal the Redhead or Canvasback.

FLORIDA GALLINULE (Gallinula chloropus cachinnans)
(See illustration, page 150)

Range: Breeds from central California, Arizona, Nebraska, Minnesota, Ontario, New York, and Vermont south through the West Indies and Mexico to Chile and Argentina, and in the Galapagos and Bermuda; winters from southern California, Arizona, Texas, and Georgia southward.

Characteristics: Although in no proper sense of the word a game bird, the Florida Gallinule looks so much like a Rail or a Coot, and moreover so commonly frequents the same general localities as these birds, that it is frequently mistaken by the gunner and shot. Although it inhabits the Florida swamps, it is by no means restricted to that State, but possesses a wide range westward to the Pacific, northward as far as Massachusetts, and south well into the Tropics.

The Gallinule's habits are a combination of Duck, Coot, and Rail, and the bird is most at home amid the tangle of vegetation that grows on the borders of fresh-water ponds, where it is careful to keep well concealed during the hours of daylight. After dusk Gallinules feel safe in the open, and then may often be seen swimming across broad stretches of open water.

The Gallinule has little to commend it for the table, and as it is absolutely harmless, sportsmen will do well to acquaint themselves sufficiently with its appearance to avoid shooting it by mistake.

AVOCET (Recurvirostra americana)
(See illustration, page 150)

Range: Breeds from eastern Oregon, central Alberta, and southern Manitoba south to southern California, southern New Mexico, northwestern Texas, northern Iowa, and central Wisconsin; winters from southern California and southern Texas to southern Guatemala.

Characteristics: Though not a game bird in any proper sense, the Avocet finds mention here because it furnishes a shining mark for the gunner, and in consequence has practically disappeared from the Atlantic coast. Numbers of Avocets are still to be seen along the borders of sloughs and ponds in the Far West, though even there the bird by no means enjoys the immunity from persecution it deserves. Its striking colors, its vociferous voice, long neck and bill, and its longer legs, combine to render the Avocet so conspicuous that its only chance for safety rests in seeing its enemies before it is seen by them. Its long legs have another function, as they enable the bird to wade in the

Photograph by Dr. John C. Phillips

MALLARDS VISITING THE ESTATE OF A FRIEND

If wild rice can be made to grow on a country place, Ducks will come in greater numbers each year, while regular feeding with corn at proper times may prove an additional attraction to whole flocks during the migration.

shallows, where its food is chiefly obtained, while its webbed toes enable it to swim easily when need arises. Its slender, upward-curved bill may well excite wonder, but Nature knew what she was about in designing it, for its form admirably adapts it for finding and seizing any prey that may rest on the surface of the muddy ooze, or for probing for various larval forms common in fresh or brackish water.

It nests on the margins of the ponds which it frequents, and no sooner does an intruder appear than it flies to meet him with loud outcries that unmistakably betray the secret it is so anxious to conceal. The Avocet, so innocent and beautiful, is now protected by the Federal law and, as its flesh is worthless, neither sportsmen nor gunners have any excuse for slaughtering it.

SPECTACLED EIDER (Arctonetta fischeri)
(See illustration, page 142)

Range: Breeds in Alaska from Point Barrow to mouth of Kuskokwim, and on the northern coast of Siberia west to mouth of Lena River; winters on Aleutian Islands.

Characteristics: Nelson's observations show this species to be strictly limited to the salt marshes bordering the east coast of Bering Sea, and thus favoring the shallow, muddy coast waters, which appear so distasteful to Steller's Eider. The same observer estimates that the Spectacled Eider does not occupy over 400 miles of coast line in the breeding season, while the width of the breeding ground will not exceed one or two miles. Writing as long ago as 1881, Nelson said of the struggle for existence the species was even then undergoing: "The species has to contend against thousands of shotguns in the hands of the natives. The diminution in all the species of waterfowl breeding along the coast is more and more marked each season, and while this may mean a desertion of one region for another in the case of the great majority of Geese and Ducks, yet for such narrowly limited species as the Spectacled Eider, and to a less extent the Emperor Goose, this diminution is but the beginning of extermination; moreover, the present scarcity of large game along the coast is having great effect in causing the natives to wage a continually increasing warfare upon the feathered game."

KING EIDER (Somateria spectabilis)
(See illustration, page 142)

Range: Breeds along coast of northern Siberia and Arctic coast of America from Icy Cape east to Melville Island, Wellington Channel, northern Greenland, northwestern Hudson Bay, and northern Ungava; winters on Pacific coast from Aleutian Islands to Kodiak Island, in the interior rarely to the Great Lakes, and from southern Greenland and Gulf of St. Lawrence south regularly to Long Island.

Characteristics: The King Eider is a resident of Arctic realms, and visits the Great Lakes and our North Atlantic coast only in winter. At Point Barrow, on the Arctic coast, Murdock

found this the most abundant bird, but even there it occurred chiefly as a migrant. The King Eider is almost as much at home in the water as a fish, and is able to keep to the open sea during the severest winter weather. In fact, probably the bulk of the species never migrates at all, or only moves south a sufficient distance to reach permanent open water. The bird feeds largely upon mussels, and as the beds are in deep water all its natatorial powers are brought into play in diving for its daily fare. It has actually been taken in the gill nets of fishermen in more than 150 feet of icy water, as Eaton states, a fact which sufficiently attests its skill and hardihood.

Like its relatives, it nests among rocks and bushes. The Eiders are not so prolific as many of our smaller Ducks, and this one commonly lays only five or six eggs. The King Eider is one of the species the Icelanders depend on to furnish the harvest of down (see under Eider, page 143). The Icelanders are not the only ones who are dependent on Eiders for the necessities of life. Nelson tells us that "the skins of all the Eiders are used in making clothing by the Alaskan Eskimo, and the skin of the female, split down the back, with head, legs, and wings removed, is a very common article of footwear. It is used inside of the sealskin boots, and is very comfortable in winter."

SURF SCOTER (Melanitta perspicillata) (See illustration, page 142)

Range: Breeds on the west coast from Kotzebue Sound to Sitka, and from northwestern Mackenzie and Hudson Strait to Great Slave Lake, central Keewatin, and northern Quebec; winters on the Pacific coast from Aleutian Islands south to San Quintín Bay, Lower California, and on the Great Lakes.

Characteristics: The Surf Duck is possibly the most abundant of the three species of Scoter Ducks, and in fall and winter it visits the northern parts of the United States on both coasts in great numbers. It appears off the coast of Massachusetts early in September. Some idea of the vast numbers of these birds may be gained from the observation of Nelson, who, late in the breeding season of 1878, saw near Stewart Island, Alaska, a continuous raft of them about ten miles long and from a half to three-fourths of a mile in width. All these appeared to be males and therefore represented only half of the birds of this species breeding in the locality. The Surf Scoter is a powerful swimmer and a superb diver and is almost as much at home in the surf as a fish. It lives on various kinds of shellfish, chiefly mussels. Naturally, having no means of breaking open the bivalves, it has to swallow them whole, and such are the bird's powers of digestion that it has no difficulty in disposing of the thick shells.

As bearing directly on the question of spring shooting, Mackay states that between April 15 and April 25 he has taken from the ovary of the female Scoter eggs that varied in size from that of a cherry stone to that of a Robin's egg. Such birds were probably mated some time before.

AMERICAN BLACK SCOTER (Oidemia americana) (See illustration, page 142)

Range: Breeds in northeastern Asia and from Kotzebue Sound to Aleutian Islands, including Near Islands; also on west shore of Hudson Bay, Ungava, and Newfoundland; winters on Asiatic coast to Japan and from islands of Bering Sea south rarely to Santa Catalina Island, California.

Characteristics: The American Scoter is abundant in Alaska, where it breeds. It is abundant also in winter off the coast of the New England and Middle Atlantic States, where it associates with the White-winged and Surf Scoters, the three species at this season possessing similar habits.

At St. Michael these Ducks are never seen in spring until the ice begins to break offshore and the marshes are dotted with pools of open water. Toward the end of May, writes Nelson, they leave the leads in the ice and are found in abundance among the salt- and freshwater ponds on the great marches, from the Yukon mouth north and south. The mating is quickly accomplished, and a nesting site chosen on the border of some pond. The spot is artfully hidden in the standing grass, and the eggs, if left by the parent, are carefully covered with grass and moss. As the set of eggs is completed, the male gradually loses interest in the female, and soon deserts her to join great flocks of his kind along the seashore, usually keeping in the vicinity of a bay, inlet, or the mouth of some large stream. A set of fresh eggs was taken on August 3, and a brood of downy young was obtained on September 9.

Nelson adds: "They are good weather indicators, and frequently, ten or twenty hours in advance of a storm, they come into the sheltered bays, sometimes to the number of a thousand or more. At such times they show great uneasiness and frequently pass hours in circling about the bay, sometimes a hundred yards high and again close over the water, the shrill whistling of their wings making a noise which is distinctly audible nearly or quite half a mile."

SNOW GOOSE (Chen hyperboreus and subspecies) (See illustration, page 146)

Range: Breeds from the mouth of the Mackenzie east probably to Coronation Gulf and Melville Island; winters from southern British Columbia, southern Colorado, and southern Illinois south to northern Lower California, central Mexico, Texas, and Louisiana.

Characteristics: For all practical purposes, the Snow Goose or White Brant may be considered a Western bird. It is, however, so much like the Greater Snow Goose, except in size, that the Eastern records of the two species are much confused, and it is difficult to determine to which bird any particular account applies. No doubt varying numbers of the Lesser Snow Goose used to visit the Eastern States where, however, the larger Goose was and is more numerous. The smaller Snow Goose breeds in northern latitudes, and in fall mi-

grates in great numbers to our Southwestern States.

In the early days of California it was no uncommon sight in winter to see stubble fields and pastures so covered with White Brant as to seem like great snow-fields. And very beautiful these snowy tracts appeared under the bright midwinter sun of California. The ranchmen, however, looked with no friendly eyes on these multitudes of Geese, since the tender blades of wheat are greatly relished by them. When they nip off the growing grain, little damage is done, and many claim, indeed, that the crop stools the better for it. No doubt, however, great damage sometimes resulted from too frequent cropping, and it was no uncommon practice to hire men to ride from grainfield to grainfield and keep up a constant fusillade to kill or scare away the Geese. Though the multitudes of earlier days no longer visit California, the bird is still numerous there.

BLACK BRANT (Branta nigricans)
(See illustration, page 146)

Range: Breeds on the Arctic Coast and islands from Point Barrow east to near mouth of Anderson River, north probably to Melville Island; common on Siberian coast, Chukchi Peninsula, and west to New Siberian Islands; winters on Pacific coast from British Columbia south to Scammon Lagoon, Lower California. They formerly wintered in great numbers in San Diego Bay.

Characteristics: The Black Brant is the Pacific counterpart of the Brant of the Atlantic coast, and like that bird an object of keen pursuit by the sportsmen of the region it frequents. Like its relative, it retires well within the Arctic Circle in summer, and like it also is an exclusively salt-water species, feeding on marine grasses and small marine life. When in search of food, Dawson tells us, the Black Brant dives as well as a Dipper (Bufflehead).

This Brant winters on the Pacific coast in great numbers from Puget Sound southward. Twenty-five years ago it wintered in great numbers in San Diego harbor, and there was so tame and unsophisticated that only moderate skill and caution were necessary to insure a reasonable bag in a very short time. The bird was usually shot from blinds or from points as the flocks passed to and from their feeding grounds. Nelson states that this Brant rarely reaches the mouth of the Yukon before May 15, when the main flight of the other Geese has passed, and many of those which remain to breed have already paired.

CACKLING GOOSE (Branta minima)
(See illustration, page 146)

Range: Breeds in western Aleutians and from Bering Strait south to northern coast of Alaska Peninsula; winters from British Columbia south to San Diego County, California.

Characteristics: The Cackling Goose is simply a dwarf species like the Canada Goose with somewhat darker colors. It is chiefly limited to our West coast. Nelson found this the most common and generally distributed Goose breeding along the Alaska coast of Bering Sea. His spirited account of it as he saw it in the Yukon delta gives an excellent idea of the nature of the visits of this and other waterfowl to Alaska. He says: "The first Goose of the season is hailed with delight by both natives and white residents, who set at work repairing their guns and making ready for the welcome change from a diet of fish, eaten all through the winter, to Geese, which soon become the staple.

"As May advances and one by one the ponds open, and the earth looks out here and there from under its winter covering, the loud notes of the various wild fowl are heard, becoming daily more numerous. Their harsh and varied cries make sweet music to the ears of all who have just passed the winter's silence and dull monotony, and in spite of the lowering skies and occasional snow-squalls every one makes ready and is off to the marshes.

"The flocks come cleaving their way from afar, and as they draw near their summer homes raise a chorus of loud notes in a high-pitched tone like the syllable 'luk' rapidly repeated, and a reply rises upon all sides, until the whole marsh re-echoes with the din, and the newcomers circle slowly up to the edge of a pond amid a perfect chorus raised by the Geese all about, as if in congratulation. Even upon first arrival many of the birds appear to be mated, as I have frequently shot one from a flock and seen a single bird leave its companions at once and come circling about, uttering loud call-notes."

RED-BREASTED MERGANSER (Mergus serrator)
(See illustration, page 135)

Range: Breeds from Arctic coast of Alaska, northern Mackenzie, Cumberland Sound, and Greenland (lat. 73°) south to southern British Columbia, southern Alberta, southern Minnesota, central Wisconsin, northern New York, and southern Maine; winters in southern Greenland, Commander Islands, and from southern British Columbia, Utah, Colorado, southern Wisconsin, southern Ontario, and Maine south to southern Lower California, Louisiana, and Florida.

Characteristics: The Red-breasted Merganser is the second of our Mergansers in size, and while its habits in general correspond well with those of the larger Goosander, they differ in some important respects. The Red-breast, for instance, frequents salt water far more than its relative, though it, too, inhabits the interior lakes and ponds. It swims and dives with wonderful skill, and in clear, rapid mountain streams, even the swift and wary trout is not safe from its prowess. This Merganser used to breed rather commonly in New England, and it still nests in the northern parts, though in diminished numbers. It conceals its nest on the ground among rocks or bushes. Like its larger relative, this Duck does not "flock," and the little parties of five or eight probably represent parents and young, which, from motives of attachment or safety, keep together.

Photograph by Herbert K. Job

WILD BLACK DUCKS (SEE PAGES 134-135) ON A GAME PRESERVE IN CONNECTICUT

TRUMPETER SWAN (Cygnus buccinator)
(See illustration, page 146)

Range: Breeds from the Rocky Mountains to the western shore of Hudson Bay and from the Arctic Ocean to about latitude 60°; winters from Chesapeake Bay, southern Indiana and southern Illinois south to Texas, and from southern British Columbia to southern California.

Characteristics: This Swan, the largest of American waterfowl, though by no means an infrequent visitor to both coasts, is by preference a resident of the interior where formerly it was very numerous. It used to nest in our northern tier of States west of the Mississippi, and Cooke states that it nested in Iowa as late as 1871. Its former breeding resorts extended north to the region west of Hudson Bay. The bird, however, has become extremely rare, and there is little doubt that the days of the species are numbered. Several causes have contributed to this end. Swans are not divers and have to procure their food, mainly aquatic roots and grasses, in shallow water, their long necks greatly aiding them to the coveted delicacies three feet or so under the surface. Thus, when feeding, they are greatly exposed to attack by hunters who can pot them almost at will. Then, too, in the days of Hudson's Bay Company, Swans' skins formed a regular article of trade with the Indians, who killed large numbers also for the pot. These may be considered contributory causes, but it was the shotgun and rifle in the hands of our gunners that settled the fate of this superb species.

The Whistling Swan, a near relative of the Trumpeter, and only a little smaller, has not suffered to the same extent, as it breeds farther north. Under protection of the Federal law it has held its numbers surprisingly well.

HUDSONIAN CURLEW (Phæopus hudsonicus)
(See illustration, page 154)

Range: Breeds on coast of Alaska from mouth of Yukon to Kotzebue Sound, and on coast of northern Mackenzie; winters from Lower California to southern Honduras, from Ecuador to southern Chile, and from British Guiana to mouth of Amazon.

Characteristics: Within the memory of many still living, the Jack Curlew, as this bird is best known to sportsmen, was the least abundant of the three species of Curlew here mentioned. To-day it is the most numerous if, indeed, we still may speak of the Eskimo Curlew as a living species. The journeys of the Jack Curlew north and south rarely take it into the interior, and except when nesting, it sticks rather closely to the vicinity of salt water. It is difficult to explain just why this Curlew should have maintained its numbers so well when its relatives have been so reduced, but persecution has taught it the art of self-protection and it is now no easy matter to bag a Hudsonian Curlew. Then, too, its inaccessible nesting-grounds aid in its preservation, although in this respect it is no better off than was the Eskimo Curlew, while the latter bird had the advantage of an oversea route to South America. It is possible, however, that, while the passage over the ocean saved the Eskimo Curlew from the onslaught of sportsmen, except in easterly storms which drove it in large flocks on our coast, it exposed the flocks to the fury of the elements during offshore gales.

The Bristle-thigh, our fourth species of Curlew, is little known in America. It certainly summers and breeds in Alaska, and in fall disperses widely over the South Pacific islands. It is one of the few water birds that winter in considerable numbers in Hawaii.

ESKIMO CURLEW (Phæopus borealis)
(See illustration, page 154)

Range: Breeds on the Barren Grounds of northern Mackenzie; winters in Argentina and Patagonia.

Characteristics: The Eskimo Curlew is an interesting example of the rapidity with which a game bird, apparently numerous enough to defy fate, may be suddenly swept off the face of the earth. Fifty years ago, and even less, as many witnesses besides myself can testify, Eskimo Curlews might often be found in the markets of Boston, New York, and other large eastern cities, and apparently no one then had a suspicion that the species was nearing its end. Audubon, speaking of his experience in Labrador in 1833, likened the numbers of this Curlew to the flocks of Passenger Pigeons, and as late as 1860 Packard noted a flock in Labrador which was perhaps a mile long and nearly as broad. Not many years ago the fishermen of Labrador and Newfoundland were salting them down by the barrelful for winter's consumption.

Because of its uncommon fatness and the excellence of its meat, it was generally known in New England as the "Dough-bird." No doubt these qualities were the chief causes of the Curlew's extinction. Thus the very qualities that should have insured the perpetuation of the species for the benefit of posterity led to its destruction by our improvident selves.

The bird is spoken of here as extinct since, to all intents and purposes, it is so, although a few possibly still survive. The lesson to be drawn from the destruction of the Curlew and the Passenger Pigeon is that in the case of any given game bird we cannot tell exactly when the danger line is crossed and the safety of the species begins to be threatened. The untimely end of the Curlew and Pigeon shows that it is the part of wisdom to apply the brakes before the bottom of the hill is reached—in other words, to adopt effective preventive measures before it is too late.

AMERICAN KNOT (Calidris canutus rufus)
(See illustration, page 152)

Range: Breeds from northern Ellesmere Island south to Melville Peninsula and Iceland; also on Taimyr Peninsula, Siberia; winters south to southern Patagonia, and from the Mediterranean to South Africa, India, Australia, and New Zealand.

Characteristics: The Knot occurs on every continent and on many islands, large and small. It is strong of wing, and when migrating appears not to regard distance, for it spans the territory that separates Grinnell Land and the Strait of Magellan. It is a characteristic bird of the sea beach, and its food is obtained by following the receding waves and seizing the minute crustaceans and mollusks momentarily uncovered by the surf.

Apparently, the Robin Snipe, as it is often called, never was so abundant on the Pacific coast as along the Atlantic, but the species promises to last longer on the Pacific because less persecuted there. Enormous bags were formerly made on the Eastern coast, more particularly during the last of May and early June. Thus the birds were pursued not only in fall but till near the opening of the nesting season, a sufficient cause of their diminution. In further explanation of the small numbers of the Knot, however, the fact counts for much that until Federal protection began there were practically no bag limits for our shore birds, and many gunners shot as long as the birds and their ammunition lasted.

All shore birds that associate in large flocks are unsuspicious, as if safety lay in numbers. When the sportsman is to be reckoned with the reverse is true. Easily decoyed by wooden stools, or by the whistled imitation of their own note, or that of the Black-bellied Plover, a flock of Robin Snipe will swing in to within gunshot, and repeat the dangerous experiment two or three times, or until the flock is reduced to a few survivors.

LESSER YELLOWLEGS (Totanus flavipes)
(See illustration, page 156)

Range: Breeds from Kotzebue Sound, Alaska, northern Mackenzie, central Keewatin, and southern Ungava to valley of the upper Yukon, southern Saskatchewan, and northern Quebec; winters in Argentina, Chile, and Patagonia.

Characteristics: The mention of the Lesser Yellowlegs inevitably recalls to mind its larger relative (see page 157), for the two birds resemble each other in many ways. Formerly the Lesser Yellowlegs was extremely abundant over most of the United States east of the Rockies, west of which range it occurs only casually.

Like so many of its relatives, this bird seeks the seclusion of the far north to nest, and reaches the Mackenzie River region by the Mississippi Valley route the early part of May, thus being, as Cooke notes, about the earliest of our shore birds to reach high northern latitudes. Naturally it is one of the first to complete its nesting, and it begins its southern journey early in July, the greater number having left the Barren Grounds by the end of August. Its principal migration route in fall appears to be the Atlantic coast, and not many years ago early Yellowlegs shooting was eagerly anticipated by the impatient sportsmen. No doubt many flocks join the Curlew and Plover on their journey over the ocean and reach South America by the all-water route.

Were a census of the Yellowlegs possible it would show a woeful diminution of numbers in the last fifty years. Both Audubon and Nuttall appear to have regarded the bird as one of the most numerous of American waders, and many who are still active hunters can recall the days when big bags were common. The Yellowlegs, however, decoys well, and when a flock had been decimated by the first discharge it frequently returned at the whistled call. The trustfulness of shore birds is great, their wiles few and ineffective, and they have to pay the natural penalty. Fortunately all are now under Federal protection.

BLACK TURNSTONE (Arenaria melanocephala)
(See illustration, page 156)

Range: Breeds from Kotzebue Sound south to British Columbia; winters from British Columbia south to Santa Margarita Island, Lower California.

Characteristics: The Black Turnstone is the Pacific-coast representative of the common Ruddy Turnstone of Atlantic shores. Little is to be said of its habits that is not equally applicable to its fellow, of which, except for color, it is a near counterpart. Black Turnstones arrive at the mouth of the Yukon about the middle of May. Nelson found it far more numerous in summer on the Bering Sea coast than the Ruddy Turnstone, and it was nesting wherever found.

Like its near relative, the Black Turnstone resorts to the interior only to nest, and as soon as the young are able to accompany their parents, all betake themselves to the coast where on the beaches and the rocky islands they find the small marine creatures upon which chiefly they live. They winter mostly on the coast of Lower California. At present the Black Turnstone appears in greater numbers than the Ruddy. Turnstones are still comparatively numerous on the West coast, primarily no doubt owing to the abundance of more highly prized game. Indeed, in California and other Pacific States, it is only in comparatively recent years that the smaller species of shore birds have received any attention at the hands of sportsmen, or even gunners. When I first visited San Diego in 1887, the shores of the northern end of the bay were dotted with many kinds of shore birds, including Curlew. They were very tame, and apparently were never disturbed by a hostile shot. Indeed, they were considered hardly fit to eat, and certainly not worth powder and shot when Ducks, Brant, and Geese were to be had with very little trouble.

PRAIRIE CHICKEN (Tympanuchus americanus and subspecies)
(See illustration, page 164)

Range: Middle North America from southern central Canada south to Texas and east (formerly) to Ohio.

Characteristics: "The Chicken" is a lover of the open prairie and as a substitute readily accepted the wheat and cornfields of the early settlers, in which it was, and still is, a valuable ally of agriculture. However great its value to the farmer, this fine Prairie Grouse must be protected with great care or it will soon be written of in the past tense. Formerly abundant all over the Mississippi region from Manitoba south to Louisiana and Texas, and extending as far west as Colorado, to-day only a scant remnant of its former numbers is left, and this remnant is dwindling under the combined attacks of sportsmen who should know better, and of gunners who neither know nor care for consequences. Ranging only a short distance north of our boundaries, the Prairie Chicken is in the strict sense of the word an American game bird, and one must go far to find a finer. Being nonmigratory, it is State property, and its fate rests solely with the individual States within which it resides.

Considering its past abundance, the fine sport its pursuit affords to the legitimate sportsman, its delicacy for the table, and the valuable service it renders the farmer in destroying his insect enemies, the record of its treatment is a shameful one. In many States no protection whatever was given the bird till its extinction was practically certain, while in the States in which adequate legislation has been enacted commonly, too large bag limits, and inadequate enforcement the laws produced their inevitable effect. Of late years, however, under better protection, as in parts of North Dakota, this bird continues in surprising numbers, evidence of what may be done in much of its former range.

SONG SPARROWS TAKING A BATH (SEE ILLUSTRATION IN COLOR, PAGE 21)

Photographs by Ernest Harold Baynes

A BALTIMORE ORIOLE AFTER A BATH (SEE ILLUSTRATION IN COLOR, PAGE 35)

Drinking fountains and bird baths are no less important than nesting places and an ample food supply in attracting feathered friends around the home. The bird bath should be a receptacle, shallow, at least around the edges, and it should be placed in a quiet spot, not too far from protecting shrubbery (see text, page 190).

ENCOURAGING BIRDS AROUND THE HOME

By Frederick H. Kennard

NOW that our country has really awakened to the importance of bird life to the citizens, and at last enacted some very wise legislation, forbidding the killing of migratory and insectivorous birds, putting migratory game birds under Federal control, and forbidding the importation of plumage from abroad, public interest in birds and their great economic value seems to have been stirred as never before.

Birds come north for the very special purpose of finding a proper place for the rearing of their young, and, this task accomplished, as autumn approaches, soon depart in search of areas where there will be throughout the winter plenty of food and cover and a more congenial climate.

If we want to make our homes attractive to birds, we must always keep the above facts in mind. If in summer we want to attract the migrants from the south, as well as the permanent residents, we must furnish them with proper places for the rearing of their young, which should include not only nesting sites, but cover, food, and water; and if in winter we want to keep some of the permanent residents about our homes and attract migrants from the north, we must remember that they are again in search of food and cover.

Once having attracted the birds, a sharp lookout must be kept in order to protect them from their enemies—cats, bird-hunting dogs, red squirrels, skunks, foxes, and other predatory animals (not forgetting the small boy that used to be ubiquitous), English Sparrows, Horned Owls, and sometimes Crows and Jays, Cooper and Sharp-shinned Hawks, and last, but not least, the black snake.

HOW TO ATTRACT THE BIRDS

The most important factor in attracting birds is cover suitable for their wants. With this provided, save in the case of birds that nest about buildings or in holes, Nature will supply the nesting sites, as well as take care of the food supply, except in winter.

At "The Pines," my place in Newton Center, Mass., we have had for eight years under close observation about 44 acres, comprising three acres of lawn dotted with a few old apple trees, six acres of wet meadow, which are allowed to grow up with tussocks of grass, cedars, alders, wild roses, and the like, and the remaining 35 acres divided into two areas of about equal size. The first of these areas, that about the house, is covered with a growth of pines, hemlocks, cedars, birches, and various other deciduous trees, among which we have taken pains to cultivate suitable coppice and undergrowth, while the second area, covered with deciduous woods, is, on account of a fire that ran through it a number of years ago, almost devoid of the smaller evergreens or protecting coppice and undergrowth (see pages 180 and 181).

In the first of these areas (page 180) some thirty different species of birds breed nearly every year, while in the second area only from three to five different species build their nests.

Almost every one who lives in the country can do something in the way of attractive planting about his house and grounds, and even in the more closely settled suburbs almost every place, no matter how small, can by judicious planting be made attractive to birds. Even a back yard may in its limited way, with proper treatment, be made a rendezvous for birds in the vicinity.

On suburban places and in the country the use of evergreens, large plantations when possible, is of prime importance as a protection from the elements, as a source of natural food supply, and on account also of the nesting sites they invariably afford. Nothing is finer than a plantation of white pine or hemlock. Spruce and balsam are beautiful and offer tempting nesting sites, while the native red cedar seems a favorite tree for the nest-builders and also contributes its berries toward the winter supply of food.

At the edge of the sand dunes at Ipswich, Mass., there is a storm-swept hill

Photograph by Thomas E. Marr and Son

WHERE BIRDS GET FOOD AND PROTECTION

A turn of the driveway at The Pines, the author's country estate, showing plantation of rhododendrons, flowering dogwoods, and black alders, with an undergrowth of ferns and foxgloves. This is a retreat much frequented in summer by Catbirds and Chewinks, while in winter it affords both food and protection for many winter birds (see text, page 179).

Photograph by George R. King

BIRDS DO NOT LIKE THIS LAND, BECAUSE OF THE ABSENCE OF UNDERGROWTH

"The most important factor in attracting birds is cover suitable for their wants. With this provided, save in the case of birds that nest about buildings or in holes, Nature will supply the nesting sites, as well as take care of the food supply, except in winter" (see text, page 179)

Photograph by Ernest Harold Baynes

A HAIRY WOODPECKER AT DINNER

This somewhat shy bird prefers the forest to the orchard and is not often seen about the house. His note is louder and sharper than that of most Woodpeckers and cannot by any stretch of the imagination be called musical.

Photograph by Louise Birt Baynes

A FRIENDLY CHICKADEE (SEE, ALSO, PAGE 17)

The Chickadee is found in all parts of the East, from Labrador to Maryland, and in all seasons of the year, but is seen most often in winter. It is a companionable bird and its friendly ways make it a general favorite.

Photograph by Louise Birt Baynes

COMPANY FOR LUNCH

In the midst of a tramp across the winter snow the naturalist halts for a rest and a little lunch, to which he invites a passing bird friend. Cordial relations have already been established, but the repast has not yet been begun (see illustration, page 185).

A BLUE JAY FEEDING ON SUET (SEE ILLUSTRATION IN COLOR, PAGE 31)

Photographs by Ernest Harold Baynes

PINE SISKINS AND REDPOLLS FEEDING ABOUT A HOUSE: NEW HAMPSHIRE

The Pine Siskin is a lover of evergreens and spends the winter wandering from copse to copse in search of seeds and pine cones. The Redpoll is a winter visitor from the far north, and with its rich crimson head and breast makes a pretty picture in the snow.

Photograph by Louise Birt Baynes

A SANDWICH FOR TWO

Having accepted the invitation, the bird settles down to enjoy his meal. The fact that he must share a sandwich with his host does not disturb him, for, like all birds, he is quick to recognize and trust a human friend (see, also, illustration, page 183).

which years ago was as bare as a billiard ball, but upon one side of which the enterprising owner set out a large plantation of evergreens. To-day that hillside is a Mecca for birds from miles around, and is noted among the Nature lovers of the region for its varying bird life both winter and summer.

From an artistic standpoint, also, the use of evergreens is to be recommended. In these days, when there seems to be such an exodus from city to country, why shouldn't our country homes be made to look as attractive in winter as in summer? While we of the northern section of the United States may not in winter be surrounded by the verdure of summer, we need not content ourselves with the bare poles of deciduous growth. Evergreens protect us and delight our eyes with their color and varying lights and shadows, and what is more beautiful than

Photograph by Ernest Harold Baynes

THE BEST KIND OF A BIRD ON A HAT

a pine wood or group of evergreens after a snowstorm?

Those of us who possess farms, while naturally jealous of every encroachment on our fields, can always find some place which may be planted. The immediate surroundings of our farm buildings are in many cases much too bare and bleak.

The average house when surrounded by proper planting almost invariably looks better than if left to stand out cold and hard and with base line unbroken.

Windbreaks may almost always be planted somewhere, with benefit to the farm as well as to the birds, while lanes may be bordered with trees and shrubbery and walls covered with vines without any possible encroachment on the fields. An old pasture planted with savin and white pine, hawthorns, elders, barberries, cornels, viburnums, and the like, may easily be transformed into a bird reservation and still be useful as a pasture.

For deciduous growth to be used for cover, choose those berry-bearing trees and shrubs whose berries are most popular with the birds; and, when possible, choose also those that may offer most convenient sites for nest-building.

SOME USEFUL FOOD PLANTS

Care should also be taken in the choice of species, so as to get, if possible, a continuous supply of food, using such fruit as the cherry, mulberry, raspberry, blueberry, huckleberry, etc., for the summer supply; elder and the various kinds of dogwood and viburnum, etc., for autumn; while for winter those plants which hold their fruit longest should be chosen, such as the hawthorn, buckthorn, mountain ash, barberry, bayberry, sumach, and wild rose.

Hedges, particularly if they are evergreen, are favorite resorts for birds, both in winter and summer, and an arbor-vitæ hedge is the best of them all. I remember such a hedge about one side of my father's old-fashioned garden that in summer invariably held its quota of Robins', Song Sparrows', and Chipping Sparrows' nests, while in winter it was the protected resort of such birds as stayed with us.

The Department of Agriculture has issued several papers containing suggestions on how to attract birds in certain regions, and in one of its yearbooks there is an interesting article on "Plants Useful to Attract Birds and Protect Fruit," by

W. L. McAtee. In this there is a list, on page 186, of the best trees and shrubs given in the order of their attractiveness to birds, as follows: Elders, raspberries and blackberries, mulberries, dogwood fruits, sumachs, wild cherries, blueberries, wild grapes, pokeberries, Virginia creeper berries, bayberries, juniper berries, service berries, holly berries, strawberries, the fruits of viburnums, hackberries, huckleberries, haws, spicebush berries, rose hips, sarsaparilla, sour gum, gooseberries, currants, and snowberries.

Photograph by B. S. Bowdish

ON INTIMATE TERMS

This jolly little White-breasted Nuthatch (see illustration in color, page 17) has just taken a dainty morsel from the lips of a friend. These little birds are very clever climbers and can run up and down tree trunks with great agility.

To the above list may be added manzanita, barberry, buffalo berry, silverberry, buckthorn, mountain ash, chinaberry, California Christmas berry, pepper tree, magnolia, knockaway, lote bush, and bluewood.

With the above comprehensive lists to choose from, it is not a difficult matter to select trees and shrubs for almost any place, no matter how small, that will supply its quota of birds' food from early summer to the following spring, while if the place is a large one, or the problem at all difficult, it may be the best policy, as well as in the end the most economical, to consult some competent landscape architect as to the proper disposition of the proposed plantations.

FOOD HOUSES AND SHELTERS

There are also many herbaceous plants whose seeds are attractive to birds. Sunflowers may be planted in groups about the flower garden or in lines among the rows of vegetables; wild sarsaparilla and pokeberry along the boundary walls; while a corner of a field can be planted with buckwheat and Japanese millet, and will prove a great attraction, particularly in winter.

In bad weather, however, particularly in our Northern States, where we are so apt to be covered with snow, artificial means of feeding should be resorted to, and food stations, food houses, and food shelters of various sorts should be established in proper places. If Quail or Grouse are to be fed, inconspicuous bough shelters may be built in protected places among the fields or woods most frequented by them, while about the house or among the neighboring plantations all sorts of devices may be resorted to.

A European bird lover has invented a food house, an adaptation of which, called the Audubon food house, has been much used on this side of the water, and is most satisfactory (see page 189). It consists of a square hip roof, with vertical glass sides suspended beneath and open at the

Photograph by Ernest Harold Baynes

THE HOSTESS ENTERTAINS

Photograph by Louise Birt Baynes

TAKING THE CAKE

This photograph shows how responsive birds are to a little attention and how tame they may become. This wild Chickadee (see, also, pages 182 and 194) will enter the house, perch upon his favorite delicacy, and enjoy a meal, in no way affrighted by the presence of his human entertainers.

Photograph by Thomas E. Marr and Son

A JUNCO (SEE ILLUSTRATION IN COLOR, PAGE 39) VISITING AN AUDUBON FOOD HOUSE

The Audubon food house consists of a square hip roof, with vertical glass sides suspended beneath and open at the bottom, the whole supported on a central rustic cedar post, encircled with food trays beneath the roof. The glass sides protect the food trays from the weather and at the same time admit light and allow of easy observation (see text, page 187, and below).

bottom, the whole supported on a central rustic cedar post, encircled with food trays beneath the roof. The glass sides protect the food trays from the weather and at the same time admit light and allow of easy observation. These, when placed among the shrubbery about one's house, prove most attractive.

The same bird lover has invented also a food bell that supplies grain and other bird food automatically from a receptacle above, and which may be suspended from a tree or piazza roof, or any other convenient place (see page 190).

Food shelves may be put up in all sorts of protected places—about houses, against tree tunks, etc.; and a food car, a sort of moving free-lunch counter, which may be run conveniently on a wire from window to neighboring tree, is actually manufactured by one enterprising man who also builds a sheltered food house that turns with the wind like a weather vane, so as always to present a lee side for the better protection of the birds.

An ingenious bird lover has originated what he calls a food tree, a freshly cut evergreen, preferably spruce or fir, or perhaps a discarded Christmas tree, set up in some convenient place, over which has been poured hot, and then allowed to cool, a mixture of food that is attractive to both insectivorous and graminivorous birds, the receipt for which is given in the little book, "How to Attract and Protect Wild Birds," as follows:

"White bread (dried and ground), 4½ oz.; meat (dried and ground), 3 oz.;

Photograph by Ernest Harold Baynes

THE FOOD BELL

This contrivance supplies grain and other bird food automatically from a receptacle above. It may be suspended from a tree or piazza roof.

hemp, 6 oz.; crushed hemp, 3 oz.; maw, 3 oz.; poppy flour, 1½ oz.; millet (white), 3 oz.; oats, 1½ oz.; dried elderberries, 1½ oz.; sunflower seeds, 1½ oz.; ants' eggs, 1½ oz."

A SIMPLE AND ATTRACTIVE FOOD SUPPLY

Perhaps the simplest scheme of feeding, the least troublesome and the most attractive to numbers of birds, is the tying of a piece of suet to a convenient limb, or perhaps to the balustrade of one's piazza, preferably in a protected spot and one that can at the same time be easily watched from some window (see page 192).

In all food houses a variety of food should be supplied—suet, crumbs, millet, hemp, rapeseed, canary seed, and the like. On my place the birds have such a wealth of natural food that it is only during the winter storms and when the ground is covered with snow that they visit the food houses; but on many other places there have been food houses erected entirely apart from any protecting shrubbery or natural food supply, and many of these seem to be well patronized both in winter and summer.

Water, particularly during the summer months or at times of drought, is, of course, necessary for the birds. If they can't get it on your place, they will be forced to look elsewhere. The proper installment of a drinking fountain or bird bath is a simple affair, and one that is almost sure to prove a great attraction to the birds, as well as a never-failing source of entertainment to the owner.

Drinking fountains may be purchased ready-made or manufactured at home. Almost any shallow receptacle will do when placed in some quiet spot not too far from protecting shrubbery, but out of reach of skulking cats. Where the cats have not been eliminated, it is sometimes safer to place the bath on a pedestal.

A pool with foundation of concrete sunken in the ground, partially filled with earth and stones and planted with cattails, Japanese iris, or other moisture-loving plants, or perhaps with water-lilies and inhabited by a few goldfish,

can be made a very interesting feature of any garden, to say nothing of its attractiveness to birds. It is essential, however, that the slope of the sides should be gradual and the water at the edges shallow.

If one has a brook or natural pond on the place, much can be done, particularly if the bottom of the pond is suitable for the planting of food for Ducks. If the lay of the ground is such that a meadow or woodland glade may be flooded and a pond thereby installed, there is hardly any limit to the enjoyment that may be derived from it.

ATTRACTING THE WILD DUCK

There is a little woodland glade, containing an acre or so, on my place, an opening in the woods surrounded by red maples, birches, alders, poison sumach, white azalea, high-bush blueberries, etc., which I flooded one winter merely as a safe skating pond for the children in the neighborhood.

Imagine my surprise and delight when one spring day, after the ice had gone, I discovered there a whole flock of wild Wood Ducks, and later during the summer was able to watch a flock of little "flappers," the progeny of a pair of wild Black Ducks that had bred there. Herons came, too, and Redwings frequented the edge of the pond. From an uninteresting swamp the place had been completely changed into a very attractive spot, replete with bird life.

If wild rice can be made to grow, Ducks will be sure to come in greater numbers each year, while regular feeding with corn at proper times may prove an additional attraction to whole flocks during the migration. If there are near-by woods, nest boxes to attract the Wood Ducks should be put up.

One may even raise Ducks, though this is often both bothersome and expensive, while the simple flooding of a meadow and intelligent planting of its shores are comparatively little trouble.

Photograph by Joseph H. Dodson

A CATBIRD ENTERING A NEST SHELTER

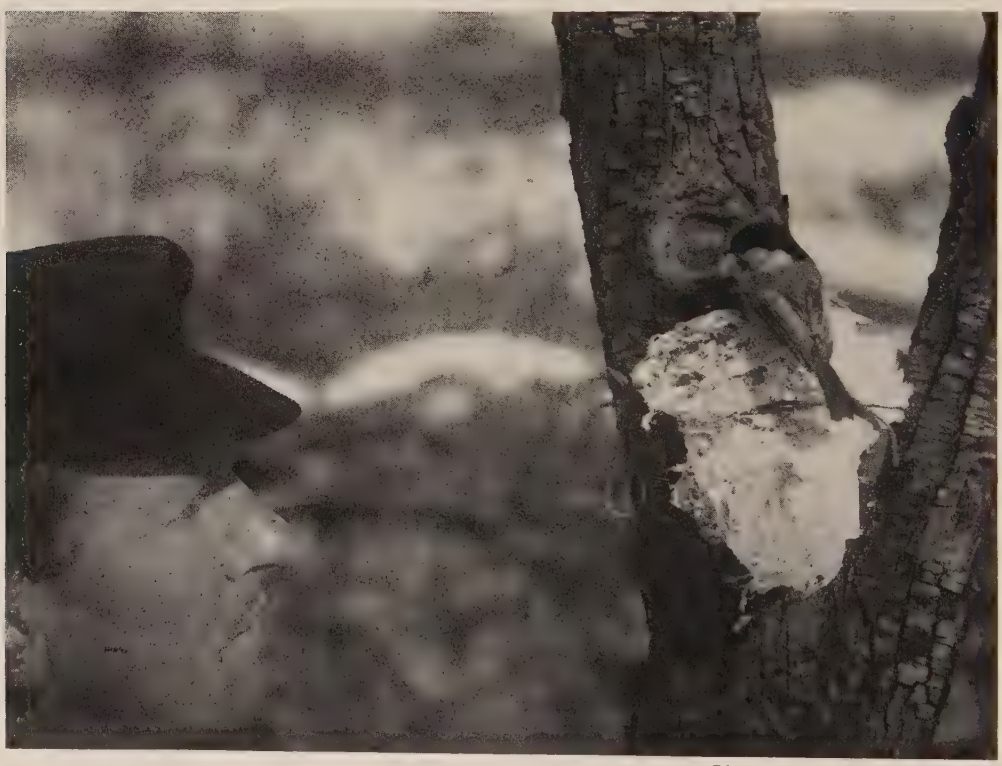
Robins and Brown Thrashers also nest in this type of shelf.

Mr. Herbert K. Job, while economic ornithologist of Connecticut, had some very interesting experiences on a game preserve in Connecticut, where low-lying areas were flooded. Wild Ducks were attracted in increasing numbers each year from miles around (see illustration, page 175).

Jack Miner, living in Ontario, Canada, several years ago fed a small flock of Wild Geese that chanced to alight in a pond close beside his house. The Geese appreciated the treatment so much that they later returned with friends, and have kept it up from year to year until now he has several hundred Wild Geese virtually in his front yard, and in a very exposed position at that. They

Photograph by William L. Finley and H. T. Bohlman

TWO EARLY BIRDS: HUNGRY WRENS (SEE ILLUSTRATION IN COLOR, PAGE 17)



Photograph by Wilbur F. Smith

PAYING A MIDWINTER VISIT

This bird friend has been attracted by a lump of suet fastened to an old pear tree.

Photograph by George R. King

THE FAVORITE NEST BOX OF A SCREECH OWL (SEE ILLUSTRATION IN COLOR, PAGE 72)

The nest boxes on the author's place have also been occupied by Bluebirds, Chickadees, Tree Swallows, Flickers, White-breasted Nuthatches, and Great-crested Flycatchers (see text, page 194).

seem absolutely fearless, and come and go at will, though a short distance away are hunters who are waiting to take a crack at them (see pages 218, 219).

Only a few of us have ponds, but the foregoing experiment shows what can be and has been done in the way of attracting and taming locally the shy Wild Geese.

HOUSES FOR THE BIRDS

Of houses, to be supplied for those birds that nest about buildings or in holes of trees, there seems to be an almost in-

Photograph by Ernest Harold Baynes

MOTHER AND DAUGHTER

This is a photograph of a wild Chickadee feeding her young in June. She does not fear in summer the hand that feeds her in winter (see, also, pages 182 and 188).

finite variety—tree stumps, real or artificial, boxes, cottages, houses, large and elaborate mansions,barrel-houses,gourds, flowerpots, tin cans, shelves, and all kinds of contraptions.

Mr. Ernest Thompson Seton went so far as to construct on his place in Connecticut a huge artificial stump, filled with imitation woodpecker's holes. He attracted numbers of different kinds of birds and animals, and he seems to have had no end of fun. It is not allowed to all of us, however, to be given either the opportunity or the enthusiasm possessed by Mr. Seton.

Of the various kinds of houses space will allow but brief mention. On my own place, which is covered largely with woods, I have used one special type of vertical box with considerable success. This is simply a section of log, hollowed out by special machinery in a very particular manner to represent Woodpecker cavities, with entrance hole of desired diameter in side and covered by a wooden cap or roof that may be lifted for purposes of investigation or in order that the nest may be cleaned from time to time, the whole bolted to an oaken batten, by which it may be fastened to a tree (see page 193).

These were formerly obtained in Europe, but are now manufactured by at least two people in this country. Those on my place have been occupied by Screech Owls, Bluebirds, Chickadees, Tree Swallows, Flickers, White-breasted Nuthatches, and Great-crested Flycatchers. House Wrens have so far avoided them, and I have failed ignominiously to attract either the Downy or the Hairy Woodpecker, both of which frequent my woods.

BIRDS THAT WILL NEST IN PREPARED HOUSES

About houses and buildings, particularly those on our farms, the ordinary type of bird house rather than the hollow log is perhaps more appropriate. Bluebirds, Tree Swallows, and House Wrens take to them readily, and if you have a large house on a high pole you may be lucky enough to attract a colony of Martins. Chickadees,Great-crested Flycatchers, and Screech Owls may use these boxes, and the following is a list of birds recorded as having bred in nest boxes of one sort or another:

Wood Duck, Sparrow Hawk, Screech Owl, Flicker, Red-headed Woodpecker, Great-crested Flycatcher, Starling, English Sparrow, House Finch, Tree and Violet-green Swallow, Purple Martin, House Wren, Parkman's Wren, Bewick's Wren, Vigor's Wren, and Texas Bewick's Wren, White-breasted Nuthatch, Tufted Titmouse, Black-capped Chickadee, Oregon Chickadee, Carolina Chickadee, Robin, and three varieties of Bluebirds—Eastern, Western, and Mountain. To this list the Carolina Wren ought probably to be added; for while I do not know personally of any record of its actually building

in a bird-box, it builds about houses and in the most unheard-of places.

Robins and Phœbes may be encouraged by shelves conveniently placed beneath the roofs of porches, piazzas, and sheds, while the insect-eating Barn and Cliff Swallows may often be helped in their choice of nesting sites by a supporting shelf. Vines on trellises or about the piazza posts are attractive nesting sites for Chipping Sparrows, as well as for Robins, and I once knew of a Blue Jay that built in a wistaria vine overhanging a friend's front porch.

One can never tell just what birds are going to do. Crows are reported to have nested in one of the squares in the city of Philadelphia and on Beacon Hill in Boston, while a pair of Sparrow Hawks has bred beneath the eaves of the Lawrence Scientific School in Cambridge, Massachusetts.

Chimney Swifts should also be encouraged, and when possible the chimneys left open at the top, and so constructed as to admit of ready occupancy.

THE ENEMIES OF THE BIRDS

Of bird enemies, cats are undoubtedly the worst. The plain, ordinary alley cat should be eliminated when possible.

Red squirrels are next on the list and should be eliminated, but I have never found the depredations of the gray squirrel to warrant similar treatment. Bird-chasing dogs are a nuisance and should be restrained during the nesting season.

Skunks and foxes should both be discouraged, and the wily raccoon and elusive weasel also, if perchance they are found to lurk about.

Of the Hawks, the Cooper and Sharp-shinned should both be destroyed, while of the Owls, the Great Horned is incapable of reform. The little Screech Owl is frequently beneficial on account of the numbers of mice it often destroys, but occasionally it is very destructive to bird life.

Crows and Jays will bear watching. There seem to be good Crows and Jays, and then again individuals among them of exceedingly bad habits, as many a long-suffering bird family knows to its sorrow.

Photograph by Louise Birt Baynes

THE DAINTIEST GUEST

An inquisitive and very puzzled Humming Bird probing an artificial flower (see illustrations in color, page 45).

In many places the English Sparrows are pests and should be shot and trapped relentlessly. They are pretty canny birds, and if once they learn one is after them with a gun they quickly desert the premises. If, owing to surrounding conditions, gunning for them seems undesirable, traps may be used with telling effect.

Last, but not least, the black snake should be killed whenever found; its large size, great activity, tree-climbing propensities, and taste for eggs and small birds have fairly won for it the reputation of being one of the birds' deadliest enemies.

THE GOLDEN PLOVER AND ARCTIC TERN ARE LONG-DISTANCE TRAVELERS

Shore birds present the longest migration routes among land-feeding birds. The Golden Plover, for instance, accomplishes the longest single flight made by any of these birds—2,400 miles across the ocean on its way from Nova Scotia to South America (see text, page 201). Yet such records are surpassed by some of the birds which obtain their living from the waters, notably the Arctic Terns, migration champions of the world (see text, page 205).

OUR GREATEST TRAVELERS

Birds that Journey from Pole to Pole, Shunning the Darkness, While Others Make 2,400 Miles in a Single Flight

By Wells W. Cooke

Formerly of the United States Biological Survey

THE migration of birds has long been considered an unfathomable mystery, but recent investigations have furnished abundant data on the when and where of migration and solved many of its puzzles. The Bureau of Biological Survey of the United States Department of Agriculture has collected much information on the migration of North American birds, and this article is an attempt to put in popular form some of the facts that have already appeared in the more technical bulletins and reports.

No correct understanding of bird migration is possible until it is considered as a voluntary evolution. All migratory movements must have begun with changes of location that were only very slight.

From this short migration, benefit accrued to individuals or to their posterity. Migration became a fixed habit, and the distance covered gradually—very gradually—increased as each succeeding extension proved advantageous. It is not to be supposed that every attempted extension was a success; in fact, it is more probable that only a small part of the experimental pioneering routes was permanently adopted.

Moreover, it must be borne in mind that the time occupied in the establishment of present migration habits and routes was measured in geologic ages, and there is no reason to suppose that changes took place during these ages any faster than they do now.

It is about a hundred years since the first reliable notes on migration in the United States were recorded, and this period has proved too short to show any perceptible difference in its time, direction, or speed. It can be affirmed, then, that the migration routes of to-day are the results of innumerable experiments as to the best way to travel from the winter to the summer home and return.

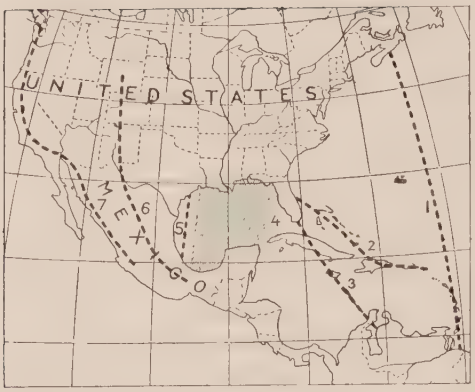
It can also be said that food supplies en route have been the determining factor in the choice of one course in preference to another, and not the distance from one food base to the next. The location of plenty of suitable provender having been ascertained, the birds pay little attention to the length of the single flight required to reach it.

PRINCIPAL MIGRATION ROUTES OF NORTH AMERICA

The shape of the land areas in the northern half of the Western Hemisphere has tended to great variations in migratory movements. If the whole area from Brazil to Canada were a plain with the general characteristics of the middle section of the Mississippi Valley, the study of bird migration would lose much of its fascination. There would be a simple rhythmical swinging of the migration pendulum back and forth spring and fall.

But a large part of the space between Brazil and Canada is occupied by the Gulf of Mexico, the Caribbean Sea, and parts of the Atlantic Ocean, all devoid of sustenance for land birds. The two areas of abundant food supplies are North America and northern South America, separated by the comparatively small land areas of Mexico and Central America, the islands of the West Indies, and the great stretches of foodless waters.

The different courses taken by the birds to get around or over this intervening inhospitable region are almost as numerous as the bird families that traverse them, and only some of the more important ones are shown on the accompanying map. The routes are numbered from the east westward (see page 198).



THE PRINCIPAL ROUTES USED BY BIRDS IN THEIR MIGRATIONS BETWEEN NORTH AND SOUTH AMERICA

The middle route, No. 4, is by far the most important. In general it may be said to extend from northwestern Florida and western Louisiana across the Gulf of Mexico to the southern coast of the Gulf (Yucatan to Vera Cruz), and thence by land through Central America to South America. Probably more individuals follow this route than all the other routes combined.

The birds east of the Allegheny Mountains move southwest in the fall approximately parallel with the seacoast, and most of them keep this same direction across the Gulf to eastern Mexico.

The birds of the central Mississippi Valley go southward to and over the Gulf. The birds between the Missouri River and the edge of the Plains, and those of Canada east of the Rocky Mountains, move southeastward and south until they join the others in their passage of the Gulf.

MILLIONS OF BIRDS MAKE GULF FLIGHT OF 500 TO 700 MILES

In other words, the great majority of North American birds bound for a winter's sojourn in Central or South America elect a short cut across the Gulf of Mexico in preference to a longer land journey by way of Florida or Texas. In fact, millions of them cross the Gulf at its widest part, which necessitates a single flight of 500 to 700 miles.

The Peninsula of Florida extends far to the south, and the great island of Cuba forms a convenient stepping-stone between its coast line and Yucatan. A bird taking this highway would avoid any long single flight; yet, with the exception of a few day-migrating Swallows, no bird is known to follow this route. A probable explanation is that southern Florida has vastly less bird food per square mile than the country to the northward, and the birds prefer a single long flight with abundant rations to a series of shorter flights on scantier fare.

Migration route No. 3, which is by way of Cuba and Jamaica, offers a much shorter journey to South America, but it is traversed by only a few species. It is popular as far as Cuba with some 60 species, of whom great numbers spend the winter on the island; about 30 of these species have a small contingent which passes on to make Jamaica its winter resort.

WEST INDIES PROVIDE SCANT FEEDING GROUNDS FOR MIGRANTS

Scarcely more than 10 species try the final long flight across the Caribbean Sea to South America, including one species each of six widely different families—the Bank Swallow, Gray Kingbird, Florida Nighthawk, Alice Thrush, Blackpoll Warbler, and Bobolink. The other members of those families employ entirely different migration routes.

It is not possible to ascertain whether these travelers on the so-called "Bobolink route" represent adventurous species that are seeking to improve on the roundabout course through Mexico, or old fogies who hold to the way of their forefathers long after their brethren have proved to their own satisfaction the superior advantages of the more western route.

The next route to the eastward, No. 2, traverses the chain of islands that extends from Florida to South America. This, too, is considerably shorter than the Florida-Yucatan route, and land can always be kept in sight; yet this line also is discredited. A few individuals of about 25 species follow it as far as Porto Rico, but only six of these continue to the South American coast, and these last in such diminished numbers as to form an insignificant fraction of the winter visitants in that region.

The explanation, of course, lies in the

question of food. The combined area of all the West Indies islands east of Porto Rico is so small that it could not furnish subsistence for even one per cent of the myriad birds which throng the main migration route across the Gulf.

To the westward the short route, No. 5, stretches a few hundred miles from the coast of Texas to northern Vera Cruz. It is adopted by a few Kentucky Warblers, Worm-eating Warblers, Golden-wing Warblers, and some others, who seek in this way to avoid a slow journey by land across a region scantily supplied with moist woodlands.

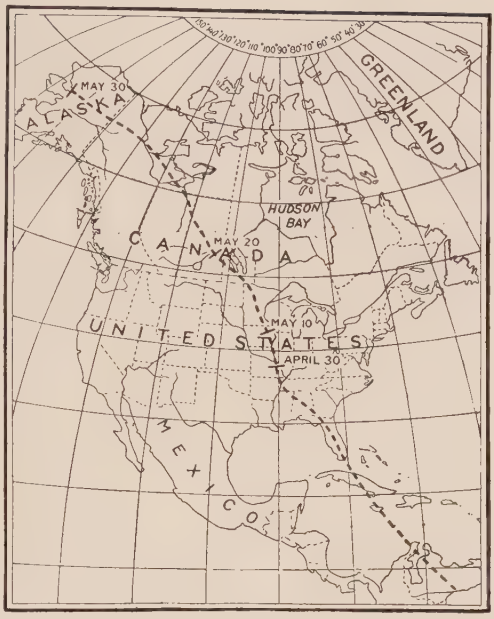
Still farther west, routes 6 and 7 represent the land journeys of those birds from the western United States who winter in Mexico and Central America. Their trips are comparatively short; most of them are content to stop when they have reached the middle districts of Mexico, and only a few pass east of the southern part of that country.

Route No. 1 remains to be noticed. It extends in an approximately north-and-south line from Nova Scotia to the Lesser Antilles and the northern coast of South America. Although more than a thousand miles shorter than the main migration route, it is not employed by any land bird. But it is a favorite fall route for thousands of water birds, and as such will be referred to again more in detail (see text, page 205).

It must not be considered that these routes as outlined on the map represent distinctly segregated pathways with clearly defined borders. On the contrary, they are merely convenient subdivisions of the one great flightway which extends from North to South America. There is probably no single mile in the whole line between northern Mexico and the Lesser Antilles which is not crossed each fall by migrating birds. What is meant is that the great bulk of the birds, both as to species and number of individuals, crosses the Gulf to eastern Mexico, while to the eastward their numbers steadily diminish.

LIGHTHOUSES LURE THOUSANDS OF BIRDS TO DESTRUCTION

It is not to be supposed that these long flights over the waters can occur without many casualties, and not the smallest of the perils formerly arose from the



MIGRATION ROUTE OF THE BLACKPOLL WARBLERS THAT NEST IN ALASKA

This bird winters in South America alongside the Cliff Swallows, but in summer seems to try to get as far as possible from its winter neighbor. Note how its northward route diverges from the northward flight of the Cliff Swallow, shown on the map on page 201. It travels at night, often flying several hundred miles in the darkness (see pages 200 and 208).

beacons which man erected along the coast to insure his own safety. "Last night I could have filled a mail-sack with the bodies of little Warblers which killed themselves striking against my light," wrote the keeper of Fowey Rocks Lighthouse, in southern Florida.

Nor was this an unusual tragedy. Every spring the lights along the coast lured to destruction myriad birds that were en route from their winter homes in the south to their summer nesting places in the north. Every fall a still greater death-toll was exacted during the the return journey.

Lighthouses are scattered every few miles along the more than 3,000 miles of our coast line. Formerly most of them had fixed white lights which were very deadly to migrating birds, especially Fowey Rocks and Sombrero Key lights on the southern end of Florida, where countless thousands of birds pass in the migrations to and from Cuba. Fortunately within recent years most of

our lights have been changed to the flashing type, thus ending a large part of the annual toll of bird life once taken at our lighthouses.

A red light or a rapidly flashing one repels the birds, but a steady white light piercing the storm and fog proves irresistible. From whatever direction the birds approach they veer to windward, and then, flying against the wind, seek the object of their infatuation. Most of them do not strike with sufficient force to injure themselves, but, like great moths, they flutter in and out of the light's rays, and finally settle on the platform or framework to await the abatement of the storm or the coming of sufficient daylight to enable them once more to orient themselves.

NEIGHBORS IN WINTER AND REMOTE STRANGERS IN SUMMER

The two maps on pages 199 and 201 show the extremes of direct and circuitous routes of migration. All Blackpoll Warblers (see text, page 94, and illustration, page 95) winter in South America. Those that are to nest in Alaska strike straight across the Caribbean Sea to Florida and go northwestward to the Mississippi River. Then the direction changes and a course is laid almost due north to northern Minnesota, in order to avoid the treeless plains of North Dakota. But when the forests of the Saskatchewan are reached, the northwestern course is resumed and, with a slight verging toward the west, is held until the nesting site in the Alaska spruces is attained.

The Cliff Swallows (see text, page 36, and illustration, page 37) are winter neighbors in South America of the Blackpoll Warblers. But when in early spring Nature prompts the Swallows that are to nest in Nova Scotia to seek the far-off land where they were hatched, they begin their journey to that region—which is situated exactly north of their winter abode—by a westward flight of several hundred miles to Panama. Thence they move slowly along the western shore of the Caribbean Sea to Mexico and, still avoiding any long trip over water, go completely around the western end of the Gulf. Hence, as they cross Louisiana, they are moving in the opposite direction from that in which they started. A northeasterly course from Louisiana to Maine, and an easterly one to Nova Scotia, complete their spring migration. This circuitous route has added more than 2,000 miles to the distance traveled.

THE WARBLER TRAVELS AT NIGHT, THE SWALLOW BY DAY

Why should the Swallow elect so much more roundabout a route than that taken by the Warbler? The explanation is simple. The Warbler is a night migrant. Launching into the air soon after nightfall, it wings its way through the darkness toward some favorite lunch station, usually several hundred miles distant, where it rests and feeds for several days before undertaking the next stage of its journey. Its migration consists of a series of long flights from one feeding place to the next, and naturally it takes the most direct course between stations, not deviating for any body of water that can be compassed at a single flight.

On the other hand, the Swallow is a day migrant. Little and often is its rule. It begins its spring migration several weeks earlier than the Warbler and catches each day's rations of flying insects during a few hours of slow evolutions, which at the same time accomplish the work of migration. It keeps along the insect-teeming shores, and the 2,000 extra miles thereby added to the migration route are but a tithe of the distance covered in pursuit of its daily food.

IDIOSYNCRASIES IN MIGRATION ROUTES

How migrating birds find their way over the widespread regions lying between their winter and summer homes has always been one of the tantalizing problems of the migration student. A favorite theory of the past, and one still claiming many advocates, is that river valleys and mountain chains form convenient highways along which the birds travel in the spring, and which are easily recognized on the return trip.

The incorrectness of this theory (at least with reference to some species) is proved by the migration routes of the Palm Warblers (see text, page 98, and illustration, page 99). They winter in the Gulf States from Louisiana eastward and throughout the Greater Antilles to Porto

Rico. They nest in Canada from the Mackenzie Valley to Newfoundland. To carry out the above theory, the Louisiana Palm Warblers should follow up the broad, open highway of the Mississippi River to its source and go thence to their breeding grounds, while the Warblers of the Antilles should use the Allegheny Mountains as a convenient guide.

As a matter of fact, as shown on the map, page 202, the Louisiana birds nest in Labrador, and those from the Antilles cut diagonally across the United States to summer in central Canada. The two routes cross each other in Georgia at approximately right angles.

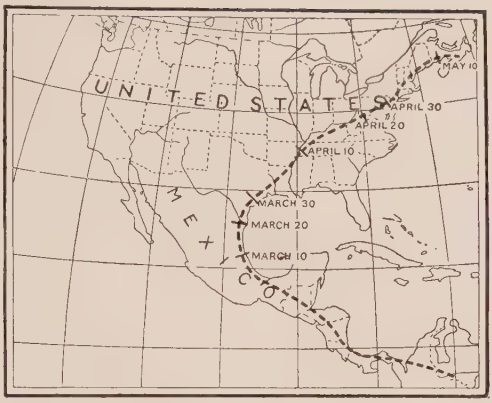
Another idiosyncrasy of bird migration is the adoption by the Connecticut Warbler (see text, page 100, and illustration, page 101) of different routes for its southward and northward journeys. All the individuals of this species winter in South America, and, as far as known, all go and come by the same direct route between Florida and South America, across the West Indies; but north of Florida the spring and fall routes diverge. The spring route (page 203) leads the birds up the Mississippi Valley to their summer home in southern Canada; but fall migration begins with a 1,000-mile trip almost due east to New England, whence the coast is followed southwest to Florida.

The Connecticut Warbler is considered rather uncommon, but the multitudes that have struck the Long Island lighthouses during October storms show how closely these birds follow the coast line during fall migration.

The map represents the spring-migration route as far as at present known. The fact that the route is practically north and south through Ohio and then turns abruptly west indicates a large and as yet undiscovered breeding area in Ontario north of Lakes Huron and Superior. Indeed, so little is known about the nesting of the Connecticut Warbler that the eggs obtained by Mr. Seton more than a quarter of a century ago probably remain unique (see page 100).

THE LONGEST CONTINUOUS FLIGHT IN THE WORLD—2,400 MILES

Incidentally, this route of the Connecticut Warbler is a conclusive argument against the theory that migration



MIGRATION ROUTE OF THE CLIFF SWALLOWS THAT NEST IN NOVA SCOTIA

The Swallow, unlike the Warbler, travels by day (see text, page 200).

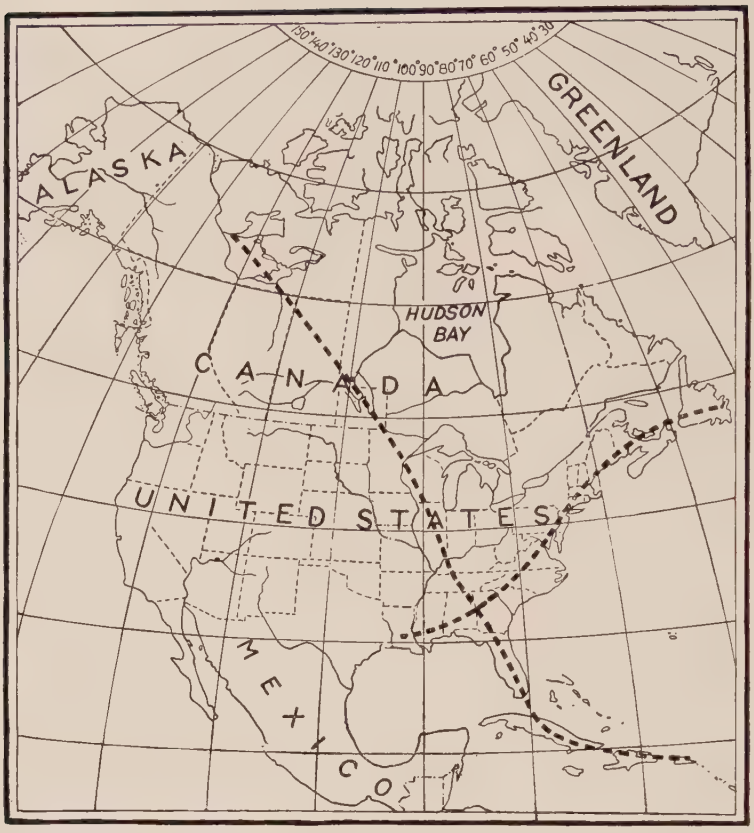
routes indicate the original pioneer path by which the birds invaded the region of their present summer homes.

Such elliptical migration routes as that mentioned above are rare among land birds, but are used and on a far larger scale by many water birds, notable among which is the Golden Plover (see illustration, page 156, and text, page 157).

This species nests along the Arctic coast of North America, and as soon as the young are old enough to care for themselves fall migration is begun by a trip to the coast of Labrador, where the Plover fattens for several weeks on the abundant native fruits. A short trip across the Gulf of St. Lawrence brings it to Nova Scotia, the starting point for its extraordinary ocean flight, due south to the coast of South America (see map, page 196).

The Golden Plover takes a straight course across the ocean, and, if the weather is propitious, makes the whole 2,400 miles without pause or rest. But if tempests arise, it may be blown out of its course to the New England coast and start anew on the advent of fair weather; or it may rest for a few days at the Bermudas, one-third of the way along its course, or at the nearest of the Lesser Antilles, still 600 miles from the mainland of South America. These, however, are emergency stop-overs, to be resorted to only in case of storms.

Having accomplished its ocean voyage,



TWO OF THE PRINCIPAL MIGRATION ROUTES OF THE PALM WARBLER

This species winters in the Gulf States from Louisiana eastward and throughout the Greater Antilles to Porto Rico. The Louisiana birds nest in Labrador, and those from the Antilles cut diagonally across the United States to summer in central Canada. The two routes cross each other in Georgia at approximately right angles (see text, page 200).

it passes across eastern South America to its winter home in Argentina.

HOW DID THE GOLDEN PLOVER COME TO USE SUCH A DIFFICULT ROUTE?

After a six months' vacation here, the Plover finds its way back to the Arctic by an entirely different route. It travels across northwestern South America and the Gulf of Mexico, reaching the United States along the coasts of Louisiana and Texas. Thence it moves slowly up the Mississippi Valley and by early June is again at the nesting site on the Arctic coast. Its round trip has taken the form of an enormous ellipse, with a minor axis of 2,000 miles and a major axis stretching 8,000 miles from Arctic America to Argentina.

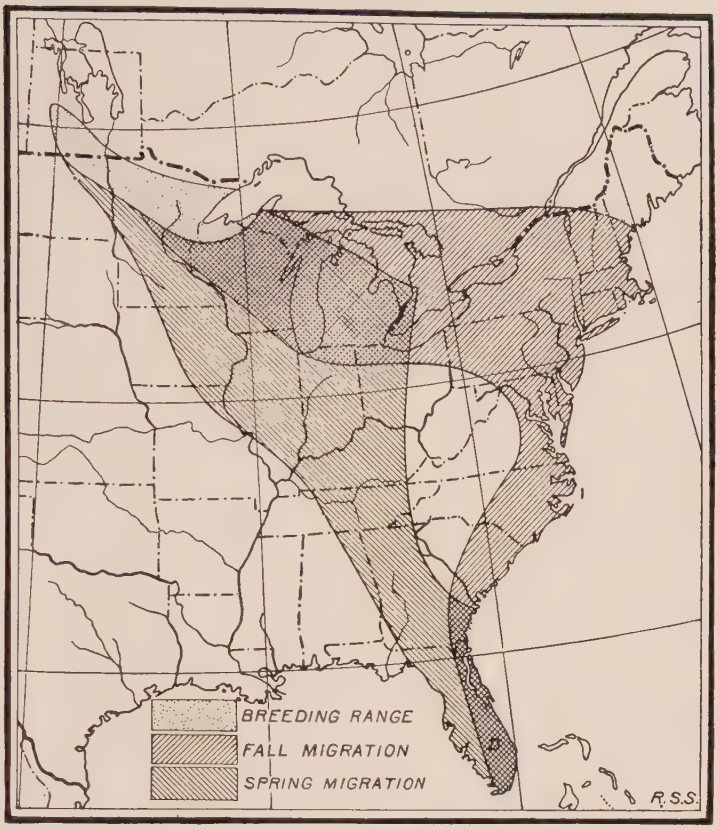
The evolution of the elliptical route of the Golden Plover, wonderful though it is in its present extended form, is easily traced through its various stages. Toward the end of the Glacial Era, when the ice began to recede, the Peninsula of Florida was submerged and a comparatively small area of land in the southeastern United States was free from ice. Any Golden Plover that attempted to follow up the retreating ice must have been confined to an all-land route from Central America through Mexico and Texas to the western part of the Mississippi Valley. As larger areas of the eastern United States were uncovered and became available for bird habitation extension of the route would be to the Northeast, until in time the whole of the Mississippi Valley to the Great Lakes could be occupied.

As the migration route lengthened and powers of flight developed, there would arise a tendency to straighten the line and shorten it by cutting off some of the great curve (No. 1, page 204) through Texas and Mexico. A short flight across the western end of the Gulf of Mexico was finally essayed (No. 2), and this gradually lengthened and its points of departure and arrival moved eastward until eventually the roundabout curve through Texas was discarded and the flight was made directly from southern Louisiana across the Gulf (No. 3).

As the great areas of Canada were

added to the birds' domain, other conditions arose. Here appeared a vast new stretch of coast and plain—the Labrador Peninsula—offering in the fall rich stores of the most delectable berries and fruits; but at migrating time, in the spring, bound by frost and shrouded in fog.

Since chinook winds made the climate of the interior of the continent just east of the Rocky Mountains especially favorable for spring migration, there arose gradually a dividing of the spring and fall routes, the fall route tending eastward (No. 4), while the spring route remained unchanged. When the fall route had worked eastward to the Gulf of St. Lawrence (No. 5), a shortening began to take out the great westward curve of the New England coast. A short ocean flight was attempted (No. 6); and, when this proved successful, it was extended until the present direct route (No. 7) across the Atlantic was obtained.



THE DIFFERENT ROUTES CHOSEN BY THE CONNECTICUT WARBLER FOR ITS NORTHERN AND SOUTHERN JOURNEYS

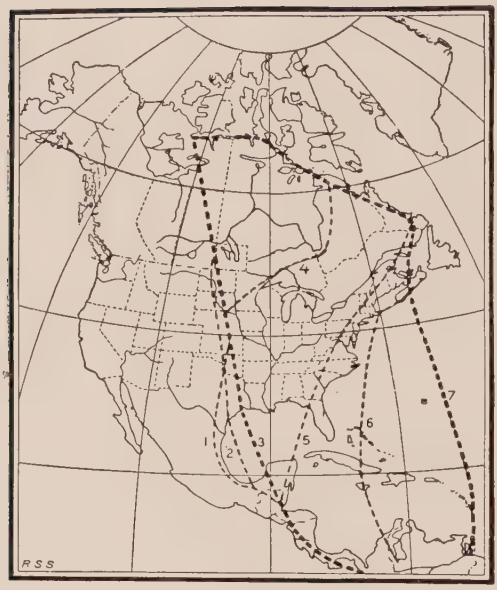
All the individuals of this species winter in South America, and, as far as known, all go and come by the same route between Florida and South America, across the West Indies; but north of Florida the spring and fall routes diverge (see text, page 201).

HOW DOES THE PLOVER FIND ITS WAY TO THE HAWAIIAN ISLANDS?

The above gives a probable and fairly satisfactory explanation of the origin of the present migration route of the Golden Plover over the Atlantic Ocean. But this is a very simple problem compared with that presented by the Pacific Golden Plover. The Hawaiian Islands are in the middle of the Pacific Ocean, distant 2,000 miles from California on the east, 2,400 miles from Alaska on the north, and 3,700 miles from Japan to the west. Golden Plovers in considerable numbers fly each fall the 2,400 miles across an islandless sea from Alaska to Hawaii, spend the winter there, and fly back again the next spring to nest in Alaska. But how did they first find their way to Hawaii?

It is not to be supposed that any birds would deliberately strike out over unknown seas hunting for a new winter home. It is scarcely more probable that, even if a large flock were caught in a storm and carried far out of its course to the Hawaiian shores, the birds would change in a single season habits of countless generations and start at once a radically new migration route.

It has already been said that present migration routes are evolutions—age-long modifications of other routes. The problem, then, is to find some migration



MAP SHOWING THE EVOLUTION OF THE PRESENT MIGRATION ROUTE OF THE GOLDEN PLOVER (SEE PAGE 202).

route from which the Golden Plover's present Hawaiian-Alaskan route could have been easily and naturally derived.

The bird breeds on the northern shores of eastern Siberia, from the New Siberian Islands to Bering Strait, and on the Alaska side of the strait south to the northern base of the Alaska Peninsula (page 205). It winters on the mainland of southeastern Asia, in the eastern half of Australia, and throughout the islands of Oceanica, from Taiwan (Formosa) and the Nansei (Ryu Kyu) Islands on the northwest to the Low (Tuamotu) Archipelago in the southeast.

The breeding range extends east-and-west about 1,700 miles, while the winter home reaches nearly 10,000 miles, from India to the Low Archipelago.

Undoubtedly the original migration route was approximately north and south, between the nests in Siberia and the winter resorts in southern Asia. In the course of time the species spread eastward in the winter to Australia, to the islands along the eastern coast of Asia, and throughout Oceanica, while at the same time the breeding range was extended eastward across Bering Strait to Alaska.

If all these extensions took place before there was any cutting off of corners in the migration route, then at this stage of development the Alaska-breeding birds were journeying over 11,000 miles (see map, page 205, Route 1) to reach the Low Archipelago, distant only a little more than 5,000 miles in an air line.

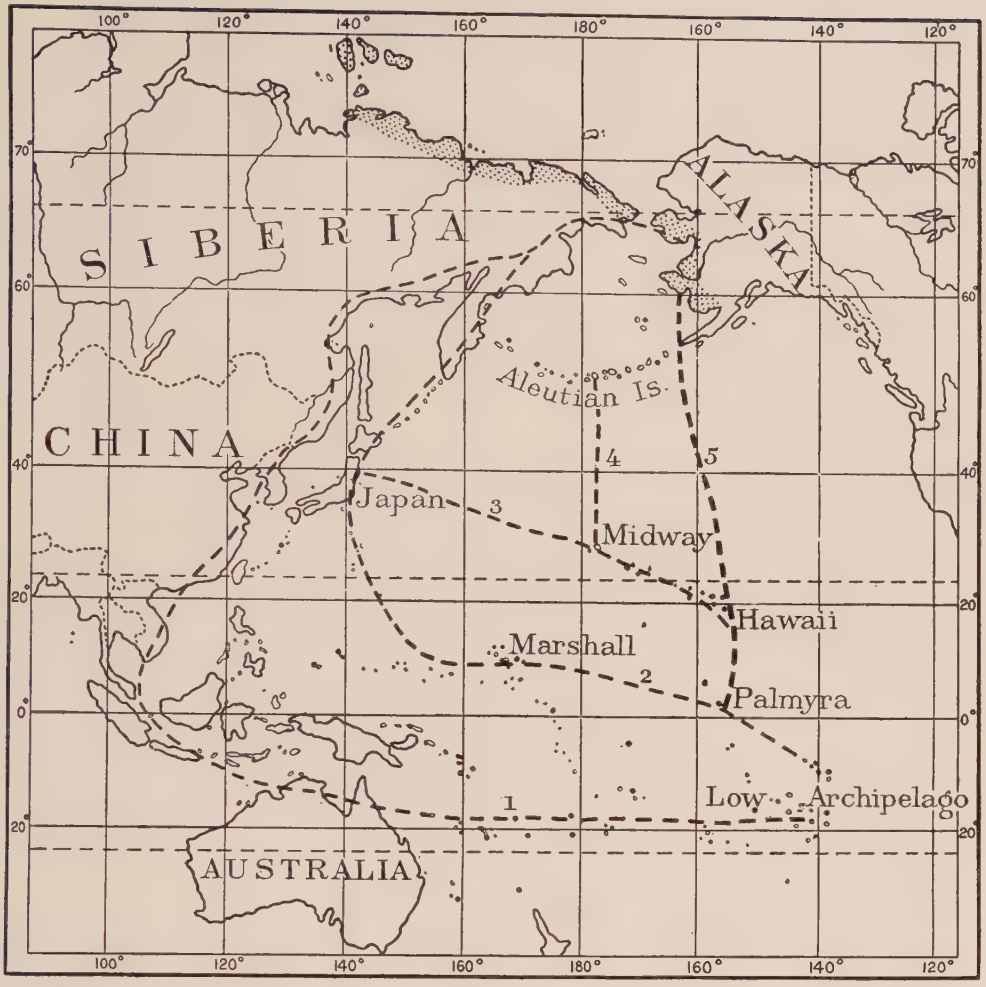
It is fair to suppose that early in the course of the eastward extension among the Pacific islands, the Plover began to shorten the roundabout journey by flights from the northern islands to eastern Asia, and finally to Japan (No. 2). The most northern island is Palmyra, and the flight from there westward to the nearest of the Marshall Islands is about 2,000 miles; thence a 3,000-mile journey, with several possible rests, brings the birds to Japan.

It is easily possible that birds accustomed to this 5,000-mile flight might be driven by storms a thousand miles out of their course and reach Hawaii. When from Hawaii they attempted to reach Japan (No. 3) they would find a chain of islands stretching for 1,700 miles in the desired direction, and the final flight of 2,000 miles from the last of these—the Midway Islands—to Japan would be no longer than previous flights to which they had become accustomed.

Having once learned the route from the Midway Islands to Japan, it would be natural that the place of alighting on the Asiatic coast should be gradually carried north and east until the direct flight was made from the Midway Islands to the Aleutians (No. 4). A natural and easy carrying of this line eastward would result in the present route (No. 5) between Hawaii and Alaska.

NEIGHBORS AND STRANGERS

Both the American and Pacific Golden Plovers nest in Alaska near Bering Strait, the former on the north and the latter on the south side of the strait. The American bird reached there by a westward extension from Canada, and the Pacific by an eastward extension from Siberia. The birds themselves are so nearly alike that only an expert can distinguish them; and, notwithstanding they are such near neighbors during the summer—scarcely a hundred miles apart—the beginning of migration makes them utter strangers; for those north of the



MAP TO EXPLAIN HOW THE PACIFIC GOLDEN PLOVER IS ABLE TO NAVIGATE TO THE HAWAIIAN ISLANDS IN THE MID-PACIFIC (SEE PAGES 203 AND 204).

The longest ocean trip without any possibility of resting is shown on this map. This is the same distance as that traversed by the Atlantic Plover, but the latter can get to land when in trouble. The dotted lines along the Arctic coast show the breeding range of the bird.

strait travel 3,000 miles east and then 6,000 miles south to Argentina, while the others make a flight directly south to their winter home in Hawaii.

THE WORLD'S MOST EXTRAORDINARY TRAVELER

The shore birds, such as the Golden Plover, present the longest migration routes among land-feeding birds; but even their surprising records are surpassed by some of the birds which glean their living from the waters. The world's migration champion is the Arctic Tern (page 196). It deserves its title of Arctic, for it nests as far north as land has been discovered; that is, as far north as the bird can find anything stable on which to construct its nest.

Indeed, so Arctic are the conditions under which it breeds that the first nest found by man in this region, only 7½ degrees from the Pole, contained a downy chick surrounded by a wall of newly fallen snow that had been scooped out of the nest by the parent.

When the young are fully grown the entire family leaves the Arctic, and sev-

eral months later they are found skirting the edge of the Antarctic Continent.

What their track is over that 11,000 miles of intervening space no one knows. A few scattered individuals have been noted along the United States coast south to Long Island, but the great flocks of thousands and thousands of these Terns which alternate from one Pole to the other have never been met by any trained ornithologist competent to learn their preferred path and their time schedule.

The Arctic Terns arrive in the far north about June 15 and leave about August 25, thus staying 14 weeks at the nesting site. They probably spend a few weeks longer in the winter than in the summer home; and, if so, this leaves them scarcely 20 weeks for the round trip of 22,000 miles. Not less than 150 miles in a straight line must be their daily task, and this is undoubtedly multiplied several times by their zigzag twistings and turnings in pursuit of food.

The Arctic Terns have more hours of daylight and sunlight than any other animals on the globe. At their most northern nesting site, the midnight sun has already appeared before their arrival, and it never sets during their entire stay at the breeding grounds. During two months of their sojourn in the Antarctic they do not see a sunset, and for the rest of the time the sun dips only a little way below the horizon and broad daylight continues all night. The birds therefore have 24 hours of daylight for at least eight months in the year, and during the other four months have considerably more daylight than darkness.

THE MOVEMENTS OF THE ROBIN

The number of miles traveled per day by a migrating bird varies greatly in different parts of the migration journey. These variations are intimately connected with corresponding variations in the speed of the northward march of spring, and are based primarily on two facts: First, that the interior of a continent warms up faster than the coasts; second, that spring is hastened in western North America by the Japan current, while it is as decidedly retarded in the east by the polar current.

The results of these two causes are strikingly shown in the migration of the Robin (page 207). This bird differs from most others in that throughout its entire course northward it adopts spring's time-table for its own.

The Robin's average temperature of migration is 35° F.; that is, it puts in an appearance soon after the snow begins to melt and streams to open, but before vegetation has made any start. These conditions occur in the central Mississippi Valley about the middle of February, and it is the first of March before spring and the Robins cross northern Missouri and arrive together in southern Iowa. Thence a whole month is consumed by the birds in their slow progress—13 miles a day—to central Minnesota. There the pace quickens, to keep up with the northward rush of spring, and another 10 days at double speed brings them to southern Canada.

Here they must make an important choice. To the north and northeast lies a land that awakens slowly from its winter's sleep, and where the sun must wage a protracted contest against the cold of the ice-masses in Lake Superior and Hudson Bay. To the northwest stretches a less forbidding region, already quickening under the influence of the chinook winds.

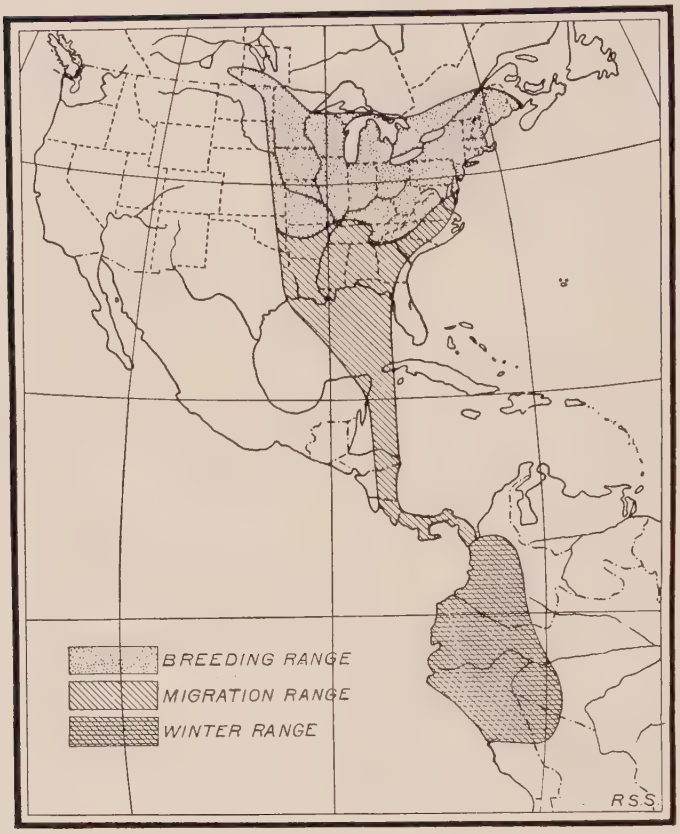
THE EASTERN ROBINS MOVE SLOWLY, THE PACIFIC MUCH FASTER

Most of the Robins from Missouri that pass through western Minnesota elect to turn to the northwest, and now they must not only keep pace with the rapidly advancing season, but must do so while traveling on a long-drawn-out diagonal. Their daily average rises to 50 miles—four times that in southern Iowa—and later, when for the birds bound for western Alaska the course becomes nearly due west, the rate increases to 70 miles a day—more than six times the speed with which the journey began.

The migration map of the Robins shows that these Alaska-breeding birds are the only ones that develop high speed. The Robins bound for Newfoundland move by easy stages along the Atlantic coast at the proverbially slow rate of the oncoming of spring in New England, and, scarcely exceeding 17 miles a day, they finally arrive at their destination May 6, when their Alaska-bound relatives are al-

THE ROBIN MOVES MUCH MORE QUICKLY ON THE PACIFIC THAN ON THE ATLANTIC SEABOARD

The dotted lines connect the places at which the Robins arrive simultaneously. The heavy solid line marks the division between the Eastern and the Western forms. The heavy dotted line represents the migration route of the Alaska-breeding birds (see text, pages 206 and 208).



THE SCARLET TANAGER'S HABITAT

The migration route of this bird is much more contracted than either the breeding or winter range (see text, page 209).

It may be fairly asked, How do we know that the Alaska Robins have come all this long distance from the central Mississippi Valley, instead of the far shorter distance from British Columbia? It happens that the Robins of the two sides of the continent are slightly different in color and in pattern of coloration. Birds of the Western style are not known north of southwestern Saskatchewan, central British Columbia, and southeastern Alaska, while the whole country to the northward is occupied by birds that evidently have come from the southeast. The heavy, solid line on the map shows the approximate meeting-ground of the two forms (see p. 207).

THE WARBLERS AND CLIFF SWALLOWS

Most migrants, except the Robins, Ducks, and Geese, wait in their warm winter quarters until springtime is far advanced, and then, traveling swiftly, occupy only a few days in their vernal migration. The Blackpoll Warbler is one of the best examples.

ready 1,200 miles farther north.

One of the most interesting things indicated on the map is the migration routes of the Robins who nest in southern Alberta. They arrive too early to have come from the south or the southeast, hence they must have come from the southwest, though this has necessitated their crossing the main range of the Rockies while the mountains were still in the grasp of winter.

Robins remain all winter on the Pacific coast, north to southwestern British Columbia, which has about the same winter temperature as St. Louis, 700 miles southward. Hence the wintering Robins of British Columbia are already far north at the advent of spring and do not need any hurried migration to reach Alberta on time. In fact, they average only 8 miles a day, the slowest rate for the species.

While the Alaska-breeding Robins start off in February and spend nearly 90 days in going from central Missouri to western Alaska, the Blackpoll Warbler remains in his tropical home during February and March, and is not seen in southern Florida until about April 20. By the first of May he arrives in central Missouri, which the Robins left 60 days earlier, and yet he reaches northwestern Alaska only 10 days later than the Robins. The latter's 90-day schedule has been shortened by the Warbler to 30 days.

The Blackpoll Warbler furnishes a striking example of speed acceleration during the latter part of migration. As indicated on the map of his migration route (page 199), between April 20 and

April 30 he goes from central Missouri to central Iowa, a distance of 300 miles, or an average of 30 miles a day. The next ten days the rate rises to 100 miles a day, while during the last few days of migration a velocity of 300 miles a day is attained.

In contrast, notice the dates,distances, and speeds indicated for the Cliff Swallow on its migration-route map (page 201). The Swallow must strike out for the north very early, since by March 10 it is already 2,500 miles from the winter home, and yet is averaging only 25 miles a day for the next 20 days, while it is rounding the western end of the Gulf of Mexico. It more than doubles this rate while passing up the Mississippi and Ohio rivers. The crossing of the Alleghenies comes next, and there are only 200 miles of progress to show for the 10 days of migration. By this time spring has really come east of the Alleghenies, and the Swallow travels 60 miles a day to its summer home in Nova Scotia.

It is to be noted that the Swallow, like the Robin and the Blackpoll Warbler, works up to high rates of speed when it is traveling on a diagonal, and that, except during the 10 days spent in crossing the mountains, each 10 days' travel covers approximately five degrees of latitude.

SOME NARROW MIGRATION ROUTES

The accompanying illustration of the range of the Scarlet Tanager (page 208) is given to show the narrowness of the migration route as compared with the width of the summer and winter homes. This Tanager (see text, page 36, and illustration, page 37) nests from New Brunswick to Saskatchewan, a region extending over 1,900 miles of longitude. The Mississippi Valley birds go south and the New England birds southwest, until they all leave the United States along 800 miles of Gulf coast from Texas to Florida. The migration lines continue to converge until in southern Central America they are not more than a hundred miles apart.

Arrived in South America for the winter, the birds scatter over a district about one-half the area of the summer home, with an extreme east-and-west range of about 700 miles.

THE BOBOLINKS ARE SEEKING NEW ROUTES

The migration route of the Bobolink shows a similar though not so decided a contraction at its narrowest part. The summer home extends from Cape Breton Island to Saskatchewan, 2,300 miles, and the migration lines converge toward the rice fields of the South, the objective point of all Bobolinks, no matter where they nest (see illustration, page 60, and text, page 61).

Having gorged themselves to repletion, they press on toward their Brazilian winter abode; but the South Carolina and Georgia birds take a course almost at right angles to that chosen by the Scarlet Tanagers from those States, and strike out directly across the West Indies for South America. In this part of their journey their migration path contracts to an east-and-west breadth of about 800 miles, while a large proportion of the birds restrict themselves to the eastern 400 miles of this route. In South America the region occupied during the winter has about one-fifth the breadth and one-third the area of the breeding range.

The Bobolinks of New England have witnessed great numerical changes, or evolutions. When the white man arrived on the scene, nearly all of New England was covered by primeval forest and Bobolink meadows were scarce. As the forest gave place to hayfields, the Bobolinks promptly took advantage of their chance and their numbers increased steadily until the maximum was reached some 40 years ago. Then the newly invented mowing machine and the horsepower hayrake began to destroy thousands of nests and caused a marked diminution in the Bobolink census.

The case of the Bobolink is a fitting close to this article, because it is revealing to us the manner of evolution of a new migration route. By nature a lover of damp meadows, it was formerly cut off from the western United States by the intervening arid region. But with the advent of irrigation and the bringing of large areas under cultivation, little colonies of nesting Bobolinks are beginning to appear here and there almost to the Pacific, and the probability is that the future will see an increase in these trans- Rocky Mountain birds.

Photograph by Guy Amsler, © Arkansas Game and Fish Commission

AN AËRIAL TRAFFIC OFFICER MIGHT FIND WORK HERE

Great flocks of Mallard Ducks that literally darken the sky still fly over parts of the United States at certain seasons of the year. From an economic point of view this bird is most important to the human race, both because of its vast numbers and its wide distribution.

BIRD BANDING, THE TELLTALE OF MIGRATORY FLIGHT

A Modern Method of Learning the Flight-Ways and Habits of Birds

By E. W. Nelson

Formerly Chief, Bureau of Biological Survey, United States Department of Agriculture

Author of "The Larger North American Mammals," "The Smaller Mammals of North America," "A Land of Drought and Desert—Lower California," etc., in the National Geographic Magazine

MAN'S interest in birds began in those far-distant primitive days when an intimate knowledge of all the wild life about him was often his only safeguard against starvation.

Long before the dawn of history the mystery of the great northerly and southerly movements each spring and autumn of vast numbers of birds of many kinds keenly interested him and stimulated his imagination. Fantastic theories were built up to account for them and entered into myths and folklore, where some still survive, even in civilized countries.

For a long period the flights of birds were considered serious portents in the affairs of men and even of nations, and priests and soothsayers used them to awe the multitude and to read the future. Literature abounds in references to bird migrations, and the poets of the sagas as well as those of more recent times have felt the mystery of these movements and have repeatedly woven them into their writings.

It has long been known that some of the smaller birds that breed in the north appear in middle latitudes on their return in July. The number of these little voyagers increases in August and the movement is in full tide in September. The hosts of wild fowl linger mainly until October and November, when the frosts of approaching winter in the north send them southward.

The multitude of Warblers that went northward in spring so gaily bedecked in all the bravery of their nuptial colors come trooping back with their young, all clad in sober hues more fitting their present prosaic task of making a living off the country, and laying in a goodly supply of fat to help meet any privations winter may hold in store in the warm southern lands they seek.

ESKIMOS WELCOME THE COMING OF THE BIRDS

In far northern lands, where untold millions of Ducks and Geese and other wild fowl go to rear their young, the advent, during the last of April or early in May, of the first of these birds is the cause of exultant joy to the people. Contentment fills their hearts, for the coming of the birds marks the end of the long, cold period of scarcity and the beginning of that part of the year in which food is again plentiful.

In the old days fur traders in Canada and Alaska rewarded with tobacco the Indian or Eskimo who saw the first Goose winging its way overhead in spring. White men joined with the natives in the jubilant welcome to the newcomer. In four consecutive seasons the writer witnessed such arrivals among the Eskimos on the icebound shore of Bering Sea.

The first comer was always a single Goose. He circled high overhead, surveying the snow-mantled region where he and his kind would later rear their young. Each time this "scout" appeared to be as excited at seeing his breeding ground as the people were to see him, and the bird would fill the air with a continuous series of loud, clanging notes, sometimes heard long before he could be seen.

Photograph by Sumner W. Matteson

MIGRANT WILD GEESE FLY IN SILHOUETTE ACROSS A NORTH DAKOTA SUNSET

© The Detroit News

WHISTLING SWANS ARE INCREASING THEIR NUMBERS (SEE ALSO TEXT, PAGE 175)

Protected from the hunter, these majestic birds are once more becoming a familiar sight in parts of the country where they were nearly extinct. Each bird has a wing-spread of from six to seven feet and can fly as fast as many an express train travels. The notes of large flocks of Swans gathered on the small lakes of their northern breeding grounds make a wonderfully impressive, deep-toned chorus.

Photograph by Thomas Bleyler

SOME OF MAN'S MOST USEFUL FEATHERED FRIENDS

Gulls perform very real services as scavengers, keeping many a beach clear of dead fish and other refuse They wander far up our rivers and even breed in large numbers on the lakes of the interior.

After viewing the snowy landscape the scout always turned back and disappeared toward the Yukon without alighting and his kind appeared no more until spots of bare ground became visible.

MILLIONS MIGRATE AS SEASONS CHANGE

The bird life of the United States is believed to total more than four billion individuals. This means that many hundred millions of migrants move north and south with the changing seasons. Though many go by day and may be seen by all who take the trouble to observe, vast numbers also pass by night.

During the height of the spring migration, those whose ears are attuned to Nature's voices may hear mysterious notes overhead, many of which may be recognized. They mark the course of winged travelers exulting in springtime vigor and approaching nuptials in the haunts which they seek toward the top of the world. Telescopes held on the moon at that time often reveal their silhouettes as they cross its face.

In autumn the throng moves southward over a longer period, and the travelers wear the soberer garb of everyday life.

Though it has been plain that migrating species, in general, move north and south—the movements of some covering nearly or quite the entire width of the continent—yet only vague information on the subject has been available, since it was impossible to determine the movements of individuals. Through bird banding a method is now developed that will not only tell us where individual birds wander, but will enable us to trace their routes and determine the exact areas where they go in the north to rear their young or in the south to winter.

We may also learn something concerning the strange, sporadic occurrence of birds in parts of the world far distant from their homes.

Such wandering individuals are probably much more numerous than we suspect. This is indicated by the repeated occurrences of Robins, Bobolinks, and other American birds in England, and even on Helgoland, that insignificant islet in the North Sea where so many visitors from distant regions have been found. St. Paul Island, the largest of the small Pribilof Islands, in Bering Sea, ap-

© E. H. Matern

LIKE ALL GOOD SAILORS, THIS GULL HAS A CHOICE VOCABULARY

When there is no garbage about to be picked up, the Herring Gulls feed largely on small shellfish, sometimes breaking open the shells by carrying them well up into the air and then dropping them on the rocks. This operation has frequently to be repeated several times before the desired result is obtained.

pears to be another landing place for lost birds, judging from the number of stragglers from eastern Asia and the Alaskan mainland that have been found there.

SYSTEMATIC BIRD BANDING IS A MODERN DEVELOPMENT

Systematic marking of birds, each properly recorded for the purpose of studying movements and habits, has developed in Europe and the United States within the past 30 years. The greatest advance has been since 1920 and it is now becoming a well-recognized line of research.

Investigators familiar with the bird life of their districts capture the birds, alive and unharmed, with many ingenious traps, and place a numbered aluminum band or ring on the leg of each. Each band bears a central address, so that whenever the bird is retaken, alive or dead, the finder may forward either the band or the number on it.

The use of birds as messengers by man began in the dim past. Perhaps the earliest record is that of Noah, who is

Photograph by R. D. Sloane

A PAIR OF "HONKERS" TAKE THE AIR

After being banded, these two Geese took up their interrupted migration none the worse for the markers they wore away with them.

said to have sent out the Raven and the Dove to prospect for land.

The first record of birds being marked to distinguish them after flight appears to be in the tenth book of Pliny's Natural History, which states that a Roman sportsman took Swallows from Volaterræ (Volterra), in Tuscany, to Rome. During the chariot races the birds were marked with colors of the winners and then liberated to carry the news back home.

For a time prior to the development of systematic banding, students desirous of lifting the veil of mystery surrounding bird movements cut the feathers so they could readily be identified. Sometimes they marked the birds with bright colors, or attached a small piece of parchment with a legend to a feather or to a leg. These crude and scattered efforts gave little information.

The first record of a bird banded appears to have been made in 1710. A Great Gray Heron, bearing several rings on one leg, was taken in Germany. One of the rings apparently had been placed on it in Turkey.

In 1899 Professor C. C. Mortensen, a school-teacher of Viborg, Denmark, began systematically to band and record Storks, Starlings, and other birds along the general lines which are still in use. Thus he became the pioneer in practical, scientific methods of bird banding, and his success led to the work being taken up in various places, especially in Great Britain, Sweden, elsewhere in Europe, and also in the United States.

The two records of birds banded in Europe being taken on this side of the Atlantic appear to be both of Kittiwake Gulls. The first was a young bird banded June 28, 1923, on the Farne Islands, off the coast of Northumberland. On August 12, 1924, it was killed in the District of St. Barbe, Newfoundland. The second was also banded on the Farne Islands, June 30, 1924, and was taken at Gross Water Bay, Labrador, in October, 1925.

No bird banded on this side has yet been taken in Europe, although many stray American birds have been recorded there. One banded American bird, however, has been recovered in Africa (see text, page 238).

AUDUBON WAS THE FIRST AMERICAN BIRD BANDER

In the United States Audubon made the first record of bird marking, about 1803, while he was living on Perkiomen Creek, near Philadelphia. He placed silver cords about the legs of a brood of Phœbes, two of which returned to the same neighborhood the following year.

The pioneers in systematic bird banding in this country were, first, Dr. Leon J. Cole, and later Mr. Howard H. Cleaves. Their enthusiasm enabled them to keep bird banding in continuous operation from the beginning of the century to the time when the work was taken over by the Biological Survey, in 1920.

Photograph from U. S. Biological Survey

HE HAS BANDED MORE THAN 4,000 MALLARDS

Mr. F. C. Lincoln is in charge of the bird-banding work of the United States Biological Survey.

No account of bird banding in the United States is complete without mention of Mr. S. Prentiss Baldwin. His able pioneer work from 1914 to 1919 in developing traps and methods for their use in the capture of small birds to be banded, and his continued investigations, merit full appreciation. His work has been done on Inwood Estate, near Thomasville, Georgia, and at Hillcrest, his summer home, near Cleveland, Ohio.

To his successful methods of operation and delightful presentation of the results to the public, combined with the entry of the Biological Survey into the work, with Mr. F. C. Lincoln in charge of this activity, may be credited much of the rapid development of this form of scientific research in America (see pp. 217, 234, 235).

Extraordinary work has also been done by Mr. Jack Miner at Kingsville, Ontario, where for years he has carried on the banding of Ducks and Geese attracted to his refuge. He states that 40 per cent of the birds he tags in the autumn return the following spring. Geese bearing his bands have been taken in 23 States. His sanctuary is an unparalleled object lesson of the confidence which may be established between man and wild things when the approach is undertaken in the right spirit (see pages 191, 218, 219).

One demonstration of the keen interest in bird banding has been the formation of four regional bird-banding associations, among which has been divided all of the territory in North America north of

Photograph by R. D. Sloane

CANADA GEESE TAKE ADVANTAGE OF A FRIEND'S HOSPITALITY

By using corn instead of shot, Mr. Jack Miner has attracted many wild birds to his sanctuary. Once a professional hunter, he is now a conservationist. Each of his bands contains a verse of Scripture and he calls the birds on which he places them his missionaries.

Photograph from W. Oliver Wise

BANDING FEATHERED ROYALTY

It is not until their third year that the Bald Eagles acquire the characteristic white head feathers that give them their name. They are nearly black the first year and quite gray the second. However, even a young one is strong enough to require three men to band it.

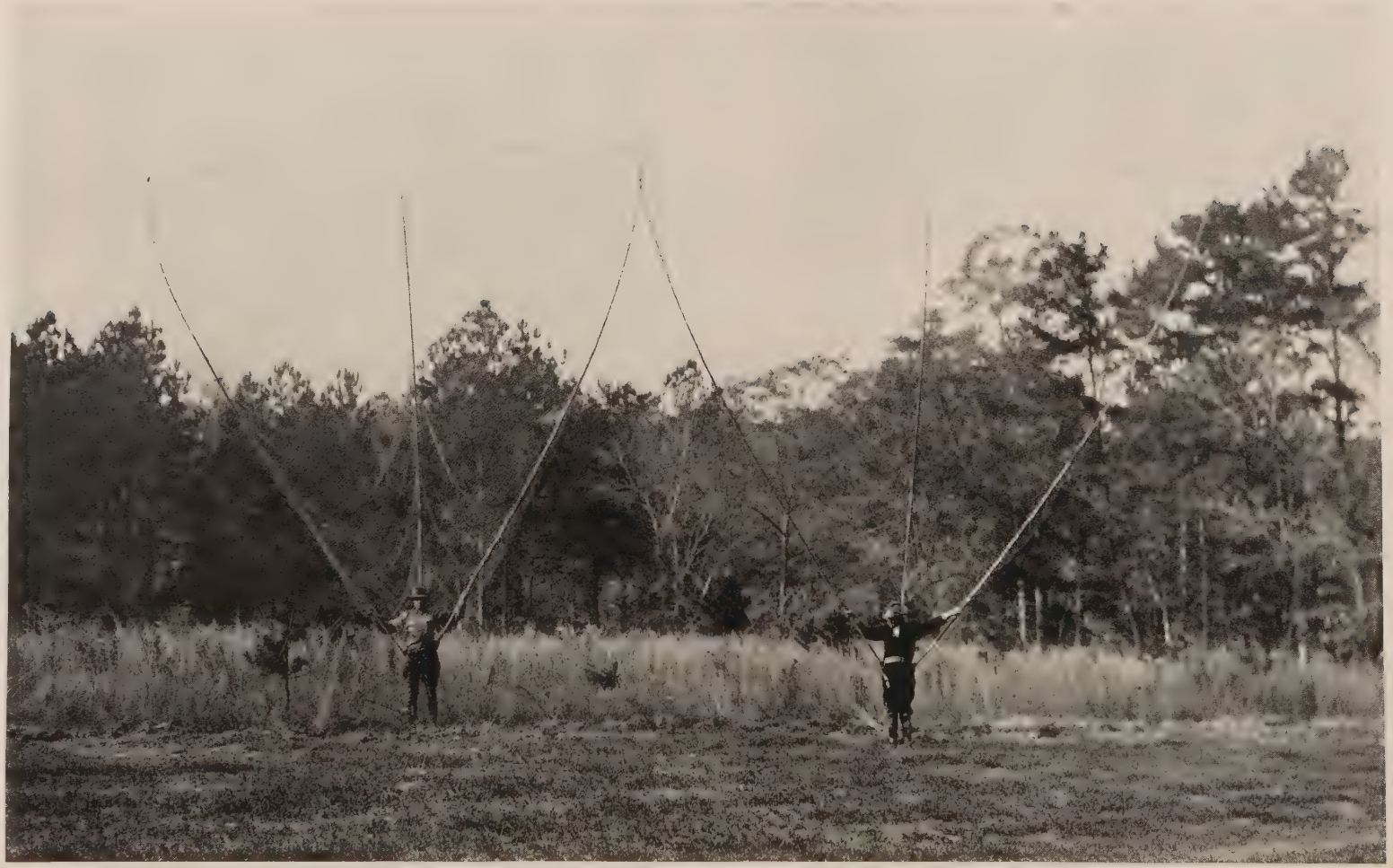
Photograph by R. D. Sloane

FEATHERED CITIZENS OF THE AIR FIND SANCTUARY HERE

Mr. Jack Miner has established a bird refuge in Ontario which has become a favorite resort for Wild Geese and other migrating flocks. They know where they are safe and fly up well out of reach of gunshot before venturing off the protected property of the sanctuary.

PLACING A BAND ON A STARLING

Hardy and pugnacious, the Starling is well fitted to care for itself in the struggle for existence. Although its ancestors came from Europe less than half a century ago, it has spread rapidly through the north and middle Atlantic sections and threatens to become a real pest.



Photograph by H. L. Stoddard

NOT MEMBERS OF A BUTTERFLY BALLET; JUST QUAIL HUNTERS

One of the unique instruments used to capture birds for banding is the clap net. Bamboo rods rise from sockets in the operator's belt and spread the net. The two side rods are then swept forward and close like wings, thus entangling birds flushed from the ground or low trees.

A SKILLFUL NIMROD OF THE NORTH

With amazing skill, Eskimo boys of Alaska spear the Emperor Geese from whose skins are made "parkas" (outer garments). Their crude thrower makes it possible to propel a spear much farther than could be done by the hand alone (see also text, page 147).

Photographs from U. S. Biological Survey

PUTTING HIS "TRADE-MARK" ON AN EMPEROR GOOSE

Described as the most beautiful and least known of the wild Geese summering in the Far North, the Emperor is only a very occasional visitor to the United States in northern California. A peculiarity of this species is the low altitude at which they often fly.

Photograph by R. D. Sloane

THE FRIENDSHIP OF WILD GEESE BEING SUCCESSFULLY CULTIVATED BY AN AGE-OLD METHOD

Mexico. They have secretaries to keep in touch with the members and to promote their activities.

In addition, these organizations hold annual meetings and publish bulletins and other matter concerning the work. A mass of new information about our bird life is being built up, and the solution of many long-standing mysteries in their movements and habits appears to be near.

BIRD BANDING WILL APPEAL TO ALL BIRD LOVERS

As bird lovers, a host of members of the National Geographic Society will be interested in this new form of bird study. It has already yielded rich results and promises much for years to come. More people in the United States than in any other part of the world have a real interest in bird life, the numbers running into millions.

In the eastern United States numberless people are familiar with the swarms of graceful and beautifully colored Warblers and other small birds that move northward through our forests in the spring. Earlier in the season, over the entire breadth of the continent, lovers of wild things have their pulses quickened by the thrilling sight of flocks of Cranes, Geese, and Ducks sweeping high across the sky, toward the waters in many a remote northern solitude.

By the human eye alone, it has been impossible to determine that the birds occurring in a locality at different periods are the same individuals that have resided there through the season. Neither has it been possible to distinguish the males from the females in Song Sparrows, House Wrens, and various other species in which the sexes are alike in color. Through banding, these questions can be answered, and also the relations of the individuals of the species to their environment.

Do the representatives of a species that breed in a certain locality remain throughout the year, or is there a shifting of the bird population? At one place in Pennsylvania, Song Sparrows resident there during the winter left in March or April and were replaced by the summer residents, which in turn disappeared on the approach of autumn. No banded Song

Photograph from U. S. Biological Survey

APPETITE AND CURIOSITY COMBINED TO EARN THESE MALLARDS BIOLOGICAL SURVEY BANDS

Sparrow captured there in midsummer was taken in midwinter, and no midwinter bird has ever been taken in summer.

There is good reason to believe that this shifting of individuals from one part of their range to take the place of birds that have moved farther south in autumn is a characteristic habit of many species. Within a few years the facts will be known in regard to this, both as to game and nongame birds, and this information will be of practical service in helping to solve problems of conservation.

TRAPPING IS ESSENTIAL TO BANDING

At the beginning, most of the birds banded in America were nestlings or parents taken at the nests. The first trap used was the Government Sparrow trap, devised by the Biological Survey to capture English Sparrows. With the growth of bird banding a great variety of small traps, mainly of wire mesh, has been developed through the ingenuity and experiments of those interested in the work.

Some of these traps are automatic; others are operated with drawstrings by a watcher concealed a short distance away.

One successful form of wire trap is attached to a tree trunk. The upper and lower ends form hinged doors, which close when a long cord leading to a nearby place of concealment is pulled. These traps, baited with suet, are successful in capturing Nuthatches, Flickers, and numerous kinds of Woodpeckers.

In addition to the various traps needed for capturing birds of different habits, the matter of bait is important. The food requirements of birds vary greatly and to take them successfully one must cater to the individual preferences of the different species, and sometimes to individuals of a species.

TRAPPING AND BANDING FASCINATE INVESTIGATORS

Even on a town lot, trapping and banding such wild, elusive creatures as birds have the elements of romance and adventure. These are increased in relation to the remoteness and wilder aspects of the surroundings where the work is done.

The recapture, after a long absence, of

Photograph by Herbert K. Job

PREDECESSOR OF THE HYDROPLANE

The Lesser Scaup, once in the air, is a high, fast flyer, but has some difficulty in rising from the water. It is a denizen of deep, cold, and preferably fresh water, and owing to a similarity in general habits, and a close resemblance, is easily confused with the Greater Scaup. The photograph was taken on Crane Lake, in the Province of Saskatchewan, Canada.

birds where they were banded, is a joyful event. Since last seen the little wanderer may have visited the desolate shore of the Arctic Ocean or may have sojourned in the luxuriant tropical forests under the Equator.

Bird banding opens the door to an intimate knowledge of wild birds in a manner and on a scale hitherto impossible. It fascinates all who engage in it. Not only may definite answers be found to problems formerly unanswerable, but the investigator has the added joy of pitting his wits against those of wild things in their capture. This gives an outlet to that spirit of the chase which has come down to most of us from our primitive ancestors, and is one of its delightful but harmless manifestations, to be classed with the sport of wild-life photography.

BANDING DOES NOT INJURE BIRDS

Endless opportunity is open for the improvement of traps and methods of operation, and one of the strongest appeals of all in the work is the opportunity it affords to hold in hand and become intimately acquainted with our charming woodland friends.

Experience has proved that the trapping, handling, and banding of birds neither harms nor seriously alarms them. In fact, a bird-trapping and banding station may be beneficial to birds and serve as the direct cause of a local increase in their numbers. The supply of food continually renewed at the traps and the constant guard that is kept against the incursions of cats and other enemies render the vicinity of such stations an effective sanctuary.

Every bird bander becomes a zealous defender of his wards, and enemies soon learn that absence from his premises is the better part of valor, since trespassers often suffer death.

There is real danger to trapped birds if they are not well protected against prowling cats and dogs by a suitable guard fence or vigilant watch. Automatic traps are indiscriminate in their captures and at times take in undesirable visitors, such as red and gray squirrels, ground squirrels, small rabbits, rats, mice, house cats, small skunks, and snakes. A 5-foot rattlesnake was found in a Quail trap in Georgia.

Trapping and handling creatures as delicate as birds for a time raised antagonism in the minds of many bird lovers, but the experience of one woman who is an ardent protectionist is typical. At first she opposed banding as likely to be dangerous to the birds. As her interest increased, however, she began trapping and banding, with the result that she is now convinced of the harmlessness of the operation.

During his bird-banding operations Mr. Baldwin (see text, page 217) has handled trapped birds more than 40,000 times and has had only four or five accidents.

The constant recapture of the same birds indicates that they do not consider the traps dangerous. In fact, the persistence with which certain individuals reenter traps in search of food might raise doubts in the minds of the moralists as to the dangers of pauperizing our feathered friends by the varied and appetizing banquets always to be had within the traps. Certainly life is made easy for a varied host of birds at nearly 1,200 places of entertainment in this country (see, also, text, page 223).

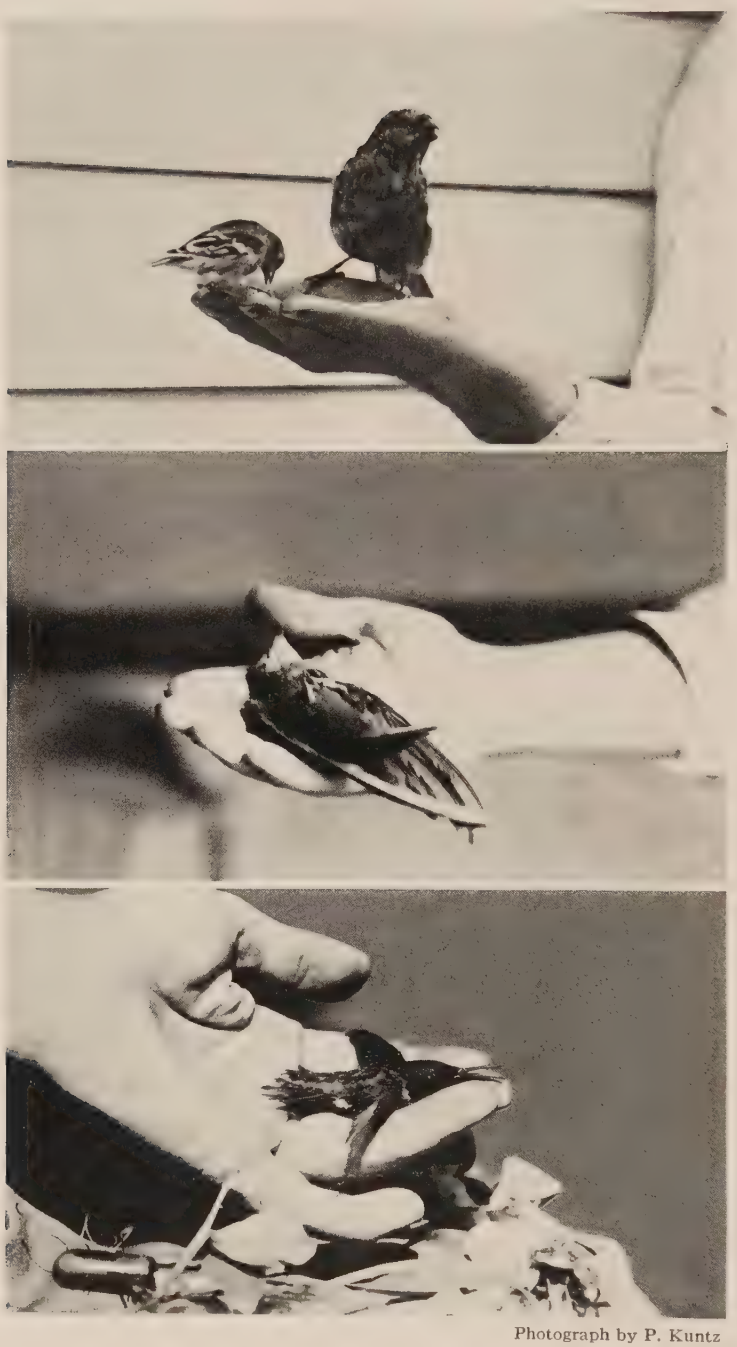
BUTCHER BIRDS MOLEST TRAPS

With the possible exception of the house cat, the Shrike, or Butcher Bird, is perhaps the most dangerous enemy of birds in and about traps at banding stations. The Common Shrike in the United States is a beautiful bird, with gray back, white underparts, and black wings which, when spread, show a large white patch in the middle (see page 231).

These markings, together with size, give the Shrike so much general resemblance to Mocking Birds that it is sometimes mistaken for this songster. There the resemblance ends, however, for the broad, black band on each side of the head, the hooked, raptorial beak, strong claws, and fierce courage characterize this little buccaneer.

It is unquestionably a far greater destroyer of small birds than is commonly appreciated. When in the neighborhood of a banding station it quickly notices the concentration of birds there and promptly proceeds to take advantage of its opportunity.

Sometimes a Shrike even enters the trap to get at the captives. More com-



Photograph by P. Kuntz

A MEDLEY OF BIRD POSES

The friendly confidence of birds about a banding station is well indicated by the Pine Grosbeak and Goldfinch feeding together on an operator's hand. A banded Chimney Swift, like this one lying hypnotized in the center picture, liked one of the stations so well that it was recaptured there for eight years. The bird in the lower illustration is a Ruby-throated Humming Bird that has been banded, and is lying quietly in the open palm before taking flight.

monly it alights on or hovers about the wire meshes of the cage, until the birds within develop an uncontrollable panic and thrust their heads against the meshes to try to escape. Then it seizes a head in its claws and promptly pulls it off or lets the bird fall back dead. Needless to say, when found about a banding station Shrikes usually have short shrift.

NUMEROUS SPECIES ENTER THE TRAPS

By establishing a series of automatic traps at the same station, which may be visited at frequent intervals, the number of birds captured in a day may vary from a few individuals to more than 200. Such captures may include a considerable variety of species. At the station near Thomasville, Georgia (see, also, text, page 217), 37 were taken one year between January and April, including such diverse kinds as the Sparrow Hawk, Mourning Dove, several kinds of Woodpeckers, Blue Jays, several kinds of Sparrows, Cedar Birds, several different Warblers, Ruby-crowned Kinglets,

Hermit Thrush, Mocking Bird, and others.

Occasionally recaptures of banded birds occur under circumstances which add the zest of amusing unexpectedness to ordinary routine. A banded bird is recaptured, its number recorded, and upon release it almost immediately reënters the trap! Or the observer may find it a short time later awaiting him in a neighboring trap.

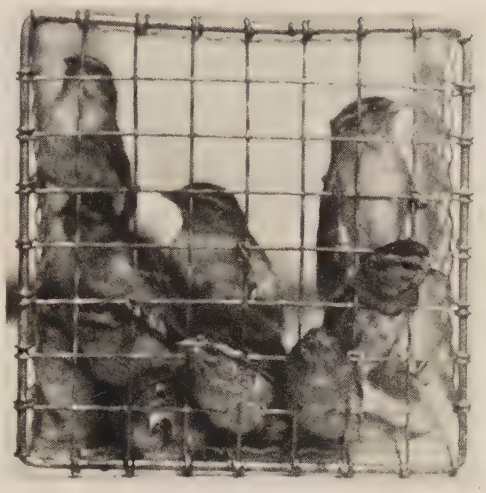
As a result of the abundance of food and protection from harm, many small birds get the trap habit. Brown Thrashers usually dash about trying to escape, but one of these birds which was captured at intervals during five different years at the station near Thomasville, Georgia, became so trapwise that eventually he came to consider one trap as his headquarters. Sometimes he took his noon siesta in it, with his head turned back on his shoulders, and had learned to find his way out of the Sparrow traps when he had satisfied his hunger.

On one occasion this bird was taken two miles away to be photographed, and then liberated. Eight days later he was back at the trap. His sense of ownership was so great that he persistently drove other birds away, and finally had to be removed so the trap might function. He was carried off and liberated so far away that he did not return.

TRAPS USED AS SUMMER RESORTS

One Chipping Sparrow at Thomasville was caught in the same trap 54 times during one season. A Fox Sparrow has a record of being caught 165 times during one winter. At Crystal Bay, Minnesota, a Song Sparrow entered and was taken from the trap 55 times between April 14 and 30; in May it was caught 106 times; during the first four days of July, 14 times. After an absence it returned July 8 and in the following ten days it was caught 47 times. On July 17 it was carried half a mile away and in 20 minutes was back in the trap from which it had been taken. The following day it repeated this performance six times and twice on the 19th, after being carried off and released at a distance of two miles.

At Thomasville a pair of Myrtle Warblers developed the trap habit and were retaken 30 times during each of two seasons, both birds usually being in the trap together.



Photograph by S. Prentiss Baldwin

A GROUP OF CAPTIVE "CHIPPIES"

These little Chipping Sparrows are well known and well loved in eastern North America. They exhibit a strong confidence in the friendliness of man and seem to prefer to be around or near his habitations.

Sparrows and most other seed eaters are ground feeders. Traps placed in spots they frequent are usually successful, but even Sparrows may discriminate and not enter a trap placed in a seemingly proper spot, although they will enter it readily when it has been moved to a location only a short distance away. At other times one of a pair will freely enter the trap, while its mate persistently avoids it.

The capture of various Woodpeckers and other tree-climbing birds presents a different problem, and traps for them must be attached to the tree trunk and baited with a different kind of food. Varying food preferences of birds call for all the knowledge of the operator on the subject. In one instance much effort was spent in unsuccessful attempts to capture Cedar Birds until pieces of apple were tried for bait and the problem was solved.

RESULTS SURPRISE BIRD BANDERS

The variety of species that may be trapped explains much of the interest in bird banding. An operator at Sault Ste. Marie in 1925 trapped and banded more

Photograph by S. Prentiss Baldwin

HOUSE WRENS ARE WELCOME NEIGHBORS

Cheery and friendly, these sprightly little songsters will nest near a human habitation whenever given any encouragement. A wooden box or an old tin can with a hole small enough to exclude English Sparrows will serve as a home for Mr. and Mrs. Wren.

than 2,000 birds, representing 32 species, 13 of which were Warblers. All were captured within 50 feet of his dining-room window.

At a station in Pasadena, California, 1,984 birds of 38 different kinds were trapped. Surprising numbers of species of Warblers, with most diverse habits, have been captured and banded, including the lovely Prothonotary, the Black-throated Blue, the Nashville, and the exquisite Blackburnian. Several species of Vireos have also yielded to the call of the bait in traps and have departed carrying their identification bands.

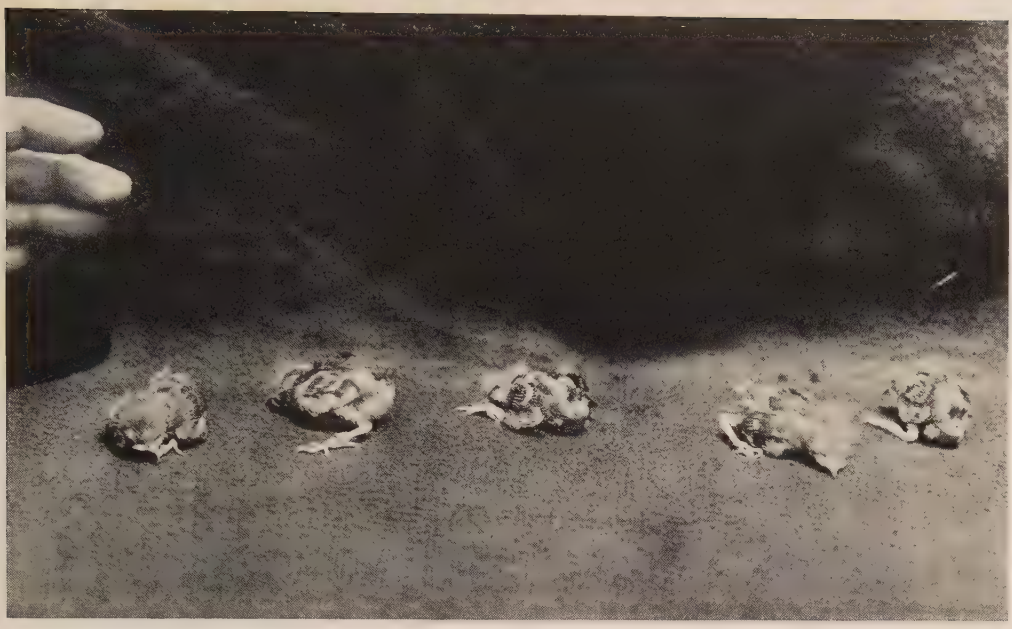
THE HOUSE WREN IS INCONSTANT

It has been the common belief of numerous bird lovers that many, if not most, birds mate for life. When an observer notes the arrival of a nest-hunting pair about a box or other breeding place that was occupied by birds of the same species during the previous season, he usually assumes that these are the identical birds of the previous year, and thus the marital fidelity of our feathered friends comes in for commendation.

So far as the House Wren is concerned, Mr. Baldwin's observations of banded birds wreck this beautiful myth. He proves that not only do these birds commonly change their mates at different seasons, but that the female Wren may divorce the mate with whom she raised one brood in spring and rear another brood the same season with a different mate. The male in such case promptly consoles himself with another charmer and rears his second brood, frequently in a closely neighboring nesting place. At other times the male is the unfaithful one and departs with a new mate.

These observations are based on the repeated recapture of banded birds on their nests, with records of their numbers made each time. In one case a mated male apparently became interested in another female, but before the affair reached the serious work of actually rearing a second brood, he returned and resumed his duties with the mate with whom he had reared the first brood that season.

Owing to rematings among Wren families it is a complicated process to keep track of their relationships. An accurate



Photograph by S. Prentiss Baldwin

BORN INTO "BANDAGE"

These baby House Wrens were banded before they were ten days old. There appear to be no set rules governing family relations among Wrens. Sometimes the male remains and assists his mate in feeding and caring for the young; at other times he promptly deserts his family.

record of three generations of House Wrens in one limited locality needs the services of a skilled genealogist.

BANDING ALARMS BIRDS VERY LITTLE

Among the interesting results of bird banding is the light that intensive work has thrown, not only on the mentality of different species, but also on differences among individual members of the species. The birds' reaction to being caught and held in the hand and often having a band fastened to one leg shows that they are little alarmed. When released they frequently fly to the nearest branch, where they sometimes preen their disarranged plumage or break into song.

In one instance a Wren flew to a branch a few yards away, where it quickly spied, caught, and ate two small caterpillars. Chipping Sparrows are usually silent, but some utter a fine shrill squeal when taken in the hands, and others keep up a talkative series of chattering notes. A Towhee caught 30 times at Thomasville had the amazing habit of bursting into full song whenever taken in hand and continuing until released. One Myrtle Warbler that was trapped six times invariably squealed from the moment it was caught, although not one of the 200 others of its kind taken in the same way made the slightest outcry.

Cardinals usually squeal when the observer approaches the trap in which they are confined. They fight viciously, pecking and biting the fingers that hold them. One Cardinal was so engrossed in the fray that, when the hand was opened to free him, he gave a last and especially vigorous bite to one of the fingers, then flew to a small tree a few yards away and broke into lusty song, evidently rejoicing at having defeated and escaped the enemy (see page 233).

Occasionally, however, one remains perfectly quiet and passive, and when released appears undisturbed by the experience. At times even such seed eaters as Chipping and White-throated Sparrows are belligerent and peck at the hand holding them.

The individual bird that shows unusual mental characteristics of any kind always gives the same reaction when caught at other times, even when a year has elapsed. Woodpeckers and Blue Jays fight viciously, but, like other small birds

Photograph from Francis H. Herrick

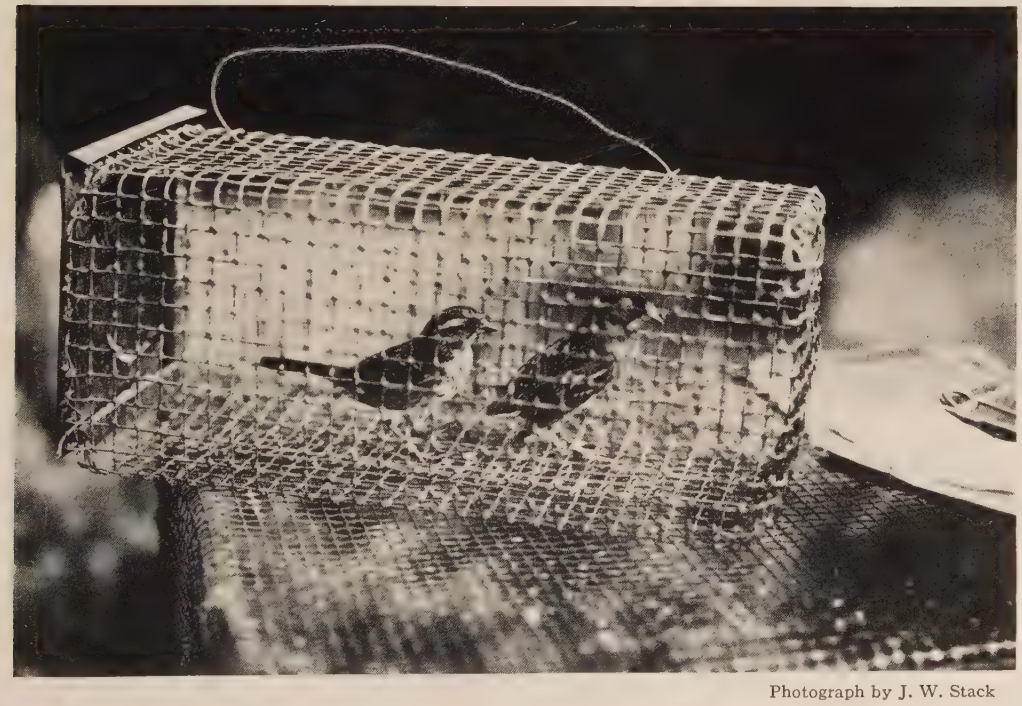
"JOVE'S BIRD" NESTLES NEAR THE SUN

Perched high in the top of an old tree or on a ledge of some precipitous crag, the Bald Eagle builds his eyrie. It is his castle, to which he adds year after year, and where successive generations of Eaglets are reared.

Photograph by S. Prentiss Baldwin

THIS MASKED MARAUDER IS A FIERCE DESTROYER OF SMALL BIRDS

The Shrikes are, perhaps, better known as "Butcher Birds," and they well deserve the name. Voracious feeders, they live on small birds, mice, small snakes, lizards, and insects. They frequently kill more than they can eat and hang the surplus on a convenient thorn bush (see page 225)



Photograph by J. W. Stack

TWO WHITE-THROATED SPARROWS AWAIT THEIR BANDS

Although among the sweetest and most plaintive of singers, the "White-throat" is not too well known, for his favorite summer haunts are in the forests of the North. His voice is not his only claim to distinction, however, since he is also one of the handsomest of the Sparrows.

Photographs by S. Prentiss Baldwin

HYPNOTIZED, OR JUST "PLAYIN' POSSUM"?

When held in the hand for a short time and then turned over on their backs, birds appear to be affected hypnotically. Practically all species react similarly, but some are slower than others in becoming quiescent. They remain quite rigid for from a few seconds to several minutes and then dart away. From top to bottom, the birds shown here are a Mourning Dove, Blue Jay, Cardinal, and Brown Thrasher.

when released, show little alarm and commonly alight near by, resuming their affairs as usual.

BANDED BIRDS "PLAY POSSUM"

One mental trait appears common to practically all species of birds being trapped. When held in the hand for a short time and then turned on their backs, they usually lie quietly with closed eyes, often for several minutes, on the open palm. Then like a flash they turn and fly off. The various species show a marked difference in the readiness with which they yield to this apparently hypnotic state, and a dissimilarity in this also appears between individuals of the same species.

Chipping Sparrows are probably the most willing to take this pose. Not only will a single bird lie in this manner, but also two (see illustration, page 240). An instance is recorded in which four Chimney Swifts being banded were laid out side by side on their backs on a board until a gust of wind disturbed them and they were gone.

Photograph by S. Prentiss Baldwin

THIS CARDINAL IS HOLDING MORE THAN HIS OWN

Trapped Cardinals often squeal shrilly when they are approached and if taken in hand fight vindictively. In the instance photographed the bird was so absorbed in punishing its captor that after being banded and freed it hung on to the finger it was biting for some time without any effort to escape (see also text, page 229).

Wild Ducks remain quiescent in the same way. On one occasion a Duck was laid on its back, with its head hanging down the side of a box, while another was being banded. Afterward it was picked up and also banded.

In holding birds in my hand to induce this pose, I found that at first there was a tendency to struggle, especially at the time the bird was turned on its back. Its eyes opened and closed rapidly, then more slowly until they remained almost shut as the bird yielded. Suddenly they opened wide and immediately it darted away. Whether this is the regular course in such case remains to be proved by further observations.

It has been suggested that the reason for this pose is that the birds' sense of balance is upset in turning them over. This does not appear to be a satisfactory explanation. Not infrequently a bird, after being held firmly in a sitting position in the hand, remains immovable

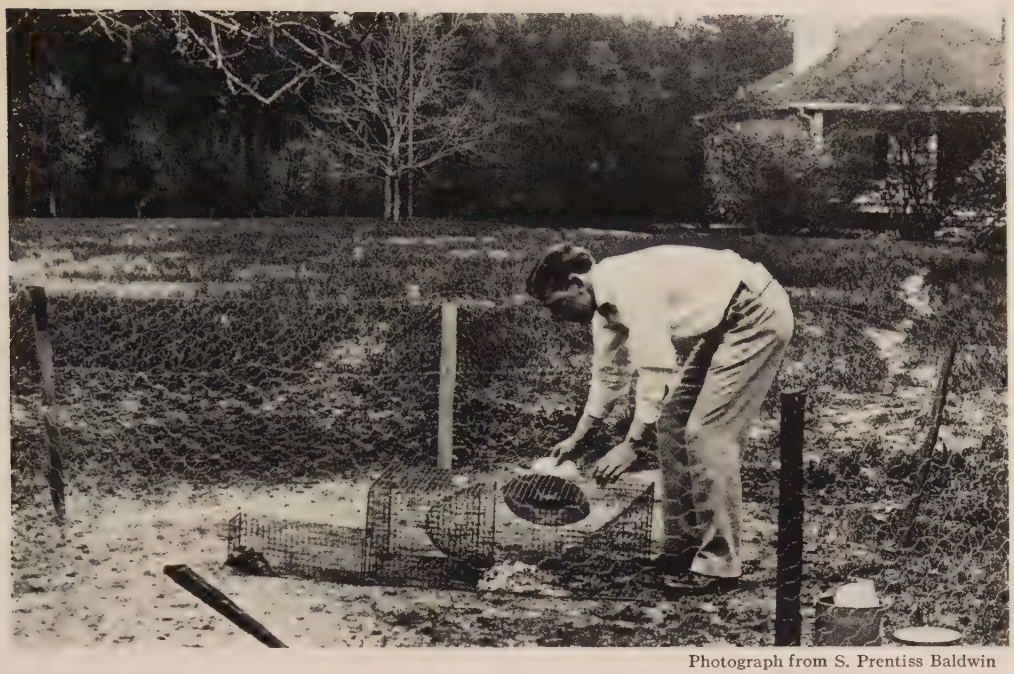
Photograph from U. S. Biological Survey

A BIOLOGICAL SURVEY SHELTER FOR BANDING YOUNG HERRING GULLS

As a result of the bands placed on Gulls in northern Lake Michigan, their wanderings have been traced to the mouth of the St. Lawrence River, down the Atlantic coast, the Mississippi Valley, and into central Mexico.

"A BIRD IN THE HAND" Photograph from S. Prentiss Baldwin

Experience in bird banding has developed a technique of handling that is easy for the bird. The method shown here was developed by an operator who has handled birds more than 40,000 times. The bird is a Towhee.



Photograph from S. Prentiss Baldwin

AN AUTOMATIC TRAP THAT WORKS

Mr. S. Prentiss Baldwin (see text, page 217) is driving the birds into a small "gathering cage," which enables the bander to take the birds in hand without the difficulty and danger to them that are attendant on their seizure in the traps.

Photograph from U. S. Biological Survey

GIVING BOBWHITE A FREE BRACELET

Few of our American game birds are more prolific than the friendly little Bobwhite. This trap, which was designed especially for taking Bobwhites, has a layer of cloth placed several inches below the wire top in order to prevent the birds injuring themselves in their efforts to escape. Mr. Herbert L. Stoddard is shown banding one of these cheery little neighbors.

© W. J. Jaycock

TREADING WATER MALLARD FASHION

Occasionally, after swimming about on the surface of the water for a considerable time, these Ducks stand erect for a moment and fan their wings rapidly, apparently for the same reason that people yawn and stretch after sitting long in one position.

Photograph from U. S. Biological Survey

MALLARDS AND PINTAILS IN A WIRE-MESH TRAP SET ON THE ICE

Pintails are trimmer than most other Ducks, with longer, slimmer necks and a more elegant and dignified carriage. They are extremely shy and quick to take alarm and, not possessing any great degree of curiosity, they are not easily fooled by decoys. This baited trap was about 100 feet long and in one day caught 414 Ducks.

Photograph by W. J. Jaycock

A HAPPY FAMILY OF MALLARD DUCKS

Probable ancestor of the common barnyard Duck and most numerous and popular of our American "quackers" is the Mallard. Feeding almost entirely on vegetable matter and with a special penchant for wild rice where it is available, it constitutes food par excellence.

with its eyes partly closed for some time after the hand is opened and it rests on the open palm.

HOW LONG DO BIRDS LIVE?

Bird banding is yielding some vital statistics as to the life terms of the various species. The accumulation of this information will unquestionably clarify a number of points of great interest, one of which concerns the enormous mortality among birds. The vast proportion of the local birds banded are never retaken. The reappearance of only a small percentage of such birds indicates that probably a large number of those missing fell victims to the innumerable dangers that beset them.

At Thomasville a Brown Thrasher was banded and recaptured for eight successive years. A Blue Jay was taken there six different years, and Wrens four years in succession. At Hillcrest a Chimney Swift has been caught in the same chimney for eight years. A Black-crowned Night Heron was taken six years after it was banded.

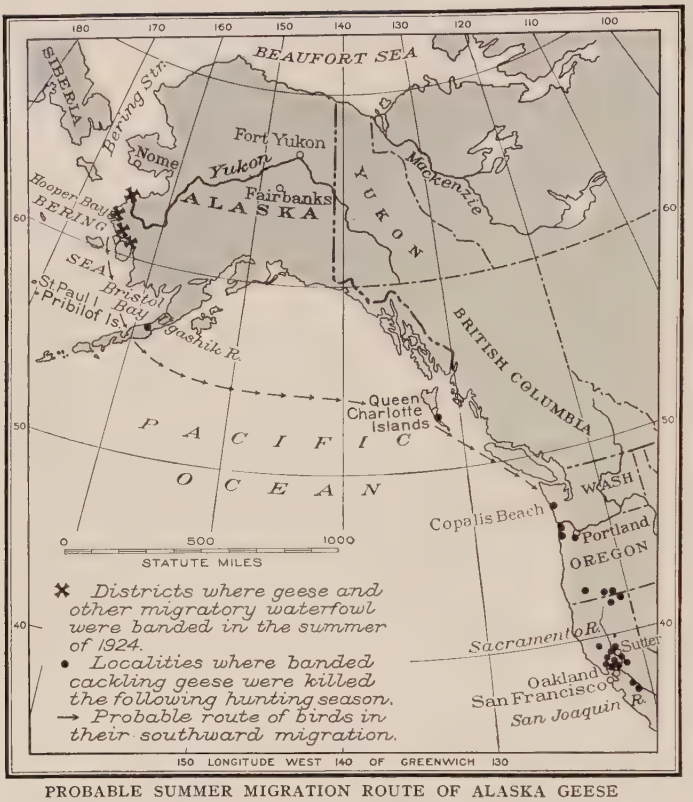
A Pintail Duck, helplessly sick from alkaline poisoning in the Bear River Marshes of Utah, was cured and banded by Dr. Alexander Wetmore during the autumn of 1914. Twelve years later it was killed in southeastern California, having escaped the perils confronting its kind for a longer period than is on record for any other banded bird.

BANDING THROWS LIGHT ON BIRDS AS TRAVELERS

The returns of bands from points where the birds wearing them have been captured or killed are illuminating as to the travels of individuals of the different species.

A Chimney Swift banded near Thomasville, Georgia, in October, 1924, was taken at East Kingston, New Hampshire, June 15.

A Purple Finch banded at Pasadena, California, in March, was captured far to the north, at Porter, Washington, in June of the same year. Before this it was believed that the Purple Finches fre-



PROBABLE SUMMER MIGRATION ROUTE OF ALASKA GEESE

quenting the lower elevations of southern California in winter were those living during the summer in the higher elevations of the neighboring mountains. The travels of this bird may be an indication that all the southern Purple Finches move southward each winter and are replaced by those from farther north.

A Robin banded in July at Crystal Bay, Minnesota, was taken more than a year later at Pachuca, on the southern border of the Mexican tableland. A Double-crested Cormorant banded in July on an island in Quebec, was shot the following December ten miles from Lake Okeechobee, Florida, and proved to be the first record of this species in that State.

One return is of extraordinary interest. A Common Tern and 100 unfledged young of its kind were banded in 1913 on Muscongus Bay, Maine. Four years later a negro paddling a canoe on a branch of the Niger River, on the West Coast of Africa, found a strange white bird floating dead in the water, with a metal band on one of its legs. He took it to a missionary, and thus the band and the record came back to the Biological Survey.

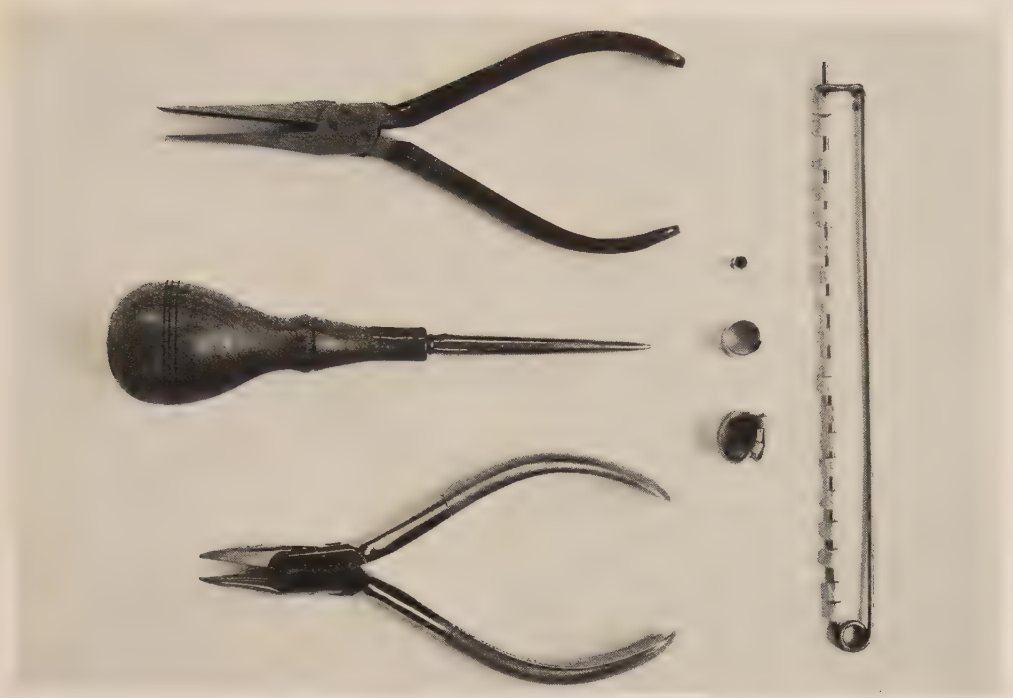
The Biological Survey has banded migrating wild fowl on a considerable scale in the famous Bear River Marshes of Utah during September and October from 1914 to 1916. Nearly 1,000 Ducks belonging to nine species were thus marked. Of these 174, or about 17 per cent of the number banded, were recovered at points as far east as Kansas, south into Mexico, west to California and north into Canada.

Such dispersal proves that these marshes serve as congregating places for migratory wild fowl journeying down from far-northern breeding grounds, and that on the approach of winter they move on to warmer regions, including California. Apparently, they reverse the movements in the spring.

SOME BIRDS MIGRATE AT A TANGENT

The startling fact developed by the flight of the banded Ducks from the Bear River Marshes was that many of them go westerly over the deserts of Nevada and across the Sierra Nevada to winter in California; others move east or southeast across the Rocky Mountains.

The recovery of banded birds in California in the winter, following their banding on the Bear River Marshes, proved that a considerable percentage of the Green-winged Teal, Shovelers, and Pintails gathering in the Utah Marshes in autumn cross to California to spend the winter. Such cross-country flights to the east and west were previously unsuspected, and proved that the migrations of many waterfowl do not always follow the more or less definite northerly and southerly routes.



Photograph from U. S. Biological Survey

THE BIRD BANDER'S TOOL KIT

Equipment for banding birds includes one of two forms of pliers, a small awl to thrust into and open a band when needed, and a set of serially numbered bands to fit the legs of birds of different sizes. A strong wire, bent into the form of a long, slender safety pin, is very useful for stringing the bands in their numbered sequence, so the next in the series is always available. These bands bear on the outside the words "Notify Biol. Surv.," below which is the number. On the inside of the band are the abbreviated words "Wash., D. C."

The autumn flight of banded birds breeding in these marshes appears to be similar to that of the visiting migrants.

More than 19,578 Ducks have been banded at various points in the Mississippi Valley, at Lake Scugog, Ontario, and elsewhere. Of these more than 3,867 have been taken subsequently at many widely scattered localities. It is worthy of note that the returns of banded Ducks vary from about 15 to nearly 20 per cent of the number banded at the different localities.

A Pintail banded at Ellinwood, Kansas, in March, 1925, was shot in Butte County, California, in December of the same year. A Blue-winged Teal banded at Lake Scugog, Ontario, in September, was shot at Port of Spain, Trinidad Island, off the coast of South America, 67 days later.

These returns, combined with those from the Ducks banded on the Bear River Marshes, indicate that each of the important areas to which wild fowl resort in large numbers in the United States is vitally important to the maintenance of our local supply of these birds, as these central areas serve as distributing reservoirs for the surrounding States.

BREEDING PLACES OF MIGRATORY WILD FOWL SHOULD BE SAFEGUARDED

That a single migratory game bird may, as its fancy dictates, sojourn parts of each year in widely separated States makes it evident that State laws alone for the conservation of such species are fruitless and that the Nation must act in the matter. This emphasizes the wisdom of the Migratory Bird Treaty and the Federal laws for the protection of migratory birds.

Migrating, however, is only one of the doings of birds. They frequently need a meal; like other creatures, they occasionally wish to rest, and unless there is to be race suicide, they must find nesting

Photograph by S. Prentiss Baldwin

A YOUNG CHARMER

The two Chipping Sparrows have succumbed to the hypnotism of being placed on their backs, but will depart very suddenly when they come out of their trance (see also text, page 233). They are among the easiest species to be thus charmed.

places. These facts make it clear that the important water areas to which they resort in large numbers must be conserved and perpetuated. Efforts to protect the birds are of little avail if we do not at the same time save sufficient water areas for their present and future welfare.

Migratory wild fowl are known to breed all across the northern part of the continent and on adjacent islands from Bering Sea to Baffin Bay. Since any adverse conditions affecting them on their breeding ground will decrease the numbers that visit us in winter, they must be properly safeguarded there, as well as on their wintering grounds, in order that we may be successful in perpetuating our wild fowl. The banding of wild fowl on their nesting grounds is the only method by which the breeding places of those wintering in the different parts of the United States and Mexico can be determined.

It is a practical certainty that about two-thirds of the wild Ducks and Geese of North America winter in the southern half of the United States and on the Pacific coast. The maintenance of our supply of these birds is dependent upon the practical and effective nature of the measures taken for their conservation.

BANDING EXPEDITIONS SENT TO BREEDING GROUNDS

Several years ago the Biological Survey developed a program of sending expeditions to important breeding grounds of wild fowl all across the northern part of the continent. It planned to provide, through banding, the knowledge needed as to the origin of the supply of our migratory wild fowl and their dispersal from these points. This information will not only be of the greatest interest to sportsmen and conservationists, but will form the basis for far more intelligent work for conserving these birds than now is possible.

The first expedition was a coöperative one organized by the Biological Survey in 1924 to visit the tundra about the head of Hooper Bay, Alaska, immediately south of the delta of the Yukon River. The expedition was led by O. J. Murie, a field

naturalist of the Biological Survey. The party included two other naturalists, H. W. Brandt, of Cleveland, and H. B. Conover, of the Field Museum of Natural History, Chicago, and was joined in the field by Frank Dufresne, of the Biological Survey. They reached Fairbanks on March 18 and soon after, with three sleds and dog teams, traveled to their destination across 700 miles of snow-covered country. This trip required hard work, but was accomplished without other mishaps than a temporary attack of snow blindness suffered by two of the members.

The party assembled May 1 at Hooper Bay, on the broad, treeless tundra bordering the coast of Bering Sea, to await arrival of the wild fowl. At first a belt of shore ice lay along the coast, but as it broke up, the northward migration of vast numbers of wild fowl passing near the mouth of the bay was the expedition's most thrilling experience. This district had never been visited before by naturalists during the breeding season, although it was first explored and mapped by the writer during the winter of 1879 (page 247).

Photograph from W. I. Lyon

BEING BANDED DOESN'T SEEM TO ANNOY THIS YOUNG HERRING GULL

All Gulls fight when picked up. Grown ones continue their resistance until released, but the young ones soon cease to struggle and take their temporary captivity philosophically. Mr. W. I. Lyon, the operator, is secretary of a large bird-banding organization.

As anticipated, it proved to be a marvelous gathering place for breeding wild fowl in great variety. Cackling and Emperor Geese abounded, but the White-fronted species was found sparingly. Whistling Swans, several species of Eider and other Ducks, with many kinds of waders, including Golden Plover, Pacific Godwits, Long-billed Dowitchers, and too many others to mention, kept the party at high tension amid the amazing number and variety of songs and maneuvers which endow these northern breeding places with the most intense interest through the mating season.

EXPEDITION SENT TO YUKON BOUNDARY

Many years ago when Thomas Riggs, later Governor of Alaska, was in charge of the International Boundary Survey between Canada and Alaska, he found many Geese breeding in the flat valley of the Old Crow River, near where it crosses the boundary, about halfway between the

Photograph by Herbert

DINING ABUNDANTLY AND OFTEN ARE THE CHIEF CONCERNS OF A GULL

The birds are attracted here because of the excellent feeding afforded them by the fishermen, who habitually throw back into the sea the inedible portion of their catches

Photograph from the Milwaukee Public Museum

SANDPIPERS PLAY TAG WITH THE WAVES ON THE WIND-SWEPT SHORES OF LAKE MICHIGAN

These extremely gentle little birds can be seen in the spring and fall running out in the wake of a wave to salvage some titbit from the wet sands, and retreating hurriedly as a new incoming breaker threatens to submerge them. They are not very fearful of man and offer a pitifully easy prey to the gunner, who hunts them despite their very small size. Along the far side of this inlet may be seen a series of wire-netting traps used to secure Sandpipers for banding.

Photograph by Herbert K. Job

ROYAL TERNS ARE GREGARIOUS BIRDS

Breeding in great colonies off the South Atlantic coast and the shores of the Gulf of Mexico, these birds nest so close together that it is difficult to walk through their breeding grounds without treading on the eggs.

Arctic Circle and the Arctic coast. This area, never visited by a naturalist, afforded another opportunity for work in practically new country, where bird banding on a considerable scale might be done.

In the spring of 1926, the Biological Survey detailed Mr. Murie (see text, page 240) to visit the breeding grounds there and to band as many wild fowl as practicable. At the same time he was to secure specimens of the wild life of this unknown area and all information possible concerning it.

He proceeded early in the spring from Washington to Fairbanks, Alaska. Immediately after the ice broke up on the rivers he went to Fort Yukon and engaged an assistant with a motor boat. Taking in tow a small barge loaded with gasoline and other necessary supplies, they set forth on the long trip into an uninhabited and little-known wilderness.

The expedition was successful. In addition to gaining a great store of information concerning the wild life of the region, Mr. Murie placed bands on a number of Geese and other birds. During the succeeding autumn, three of the Geese were taken in western Alberta, Idaho, and Nevada, indicating a strong probability that the wild fowl on the eastern border of Alaska also winter west of the 100th Meridian.

MIGRATORY WILD FOWL OF THE UNITED STATES FORM TWO DISTINCT GROUPS

Records from the banding of Ducks on their breeding grounds and at their other great gathering places are yielding a harvest of valuable information.

The returns demonstrate that migratory wild fowl in the United States, both those breeding here and those which visit us during the migration and winter, are separated into two well-marked groups: those of the region extending from the western Dakotas, western Kansas, and western Texas to the Pacific, and those which occur from the eastern Dakotas, eastern Kansas, and eastern Texas to the Atlantic.

The two areas occupied by these separate groups correspond to the arid west-

Photograph from U. S. Biological Survey

YOUNG CASPIAN TERNS CORRALED FOR BANDING

This "haul" netted more than 700 birds. Returns from birds banded at this station in northern Lake Michigan have been received from as far south as Colombia and as far north as Nova Scotia.

ern region and to the more humid eastern part of the continent. The 100th Meridian of Longitude, a commonly accepted dividing line between the arid West and the more humid East, appears to be well located for marking the boundary between these areas.

The accompanying map (see page 238) shows in a diagrammatic way a few of the points where thousands of Ducks of various species have been banded and some of the points at which they have been subsequently taken. This evidence and additional facts of the same character obtained in this way strongly indicate that the birds of either the western or the eastern area might be practically exterminated without seriously interfering with the supply of birds in the other regions. This discovery is of the utmost importance in the development of the necessary conservation measures for perpetuating our wild fowl.

The number of returns of bands on birds found dead indicates the perilous existence of these habitants of field and forest. To the casual observer the birds' active movements, their songs and cheerful call notes, give the impression of a joyous life; yet birds live in the midst of deadly perils coming from many sources, and the mortality among them is enormous. In spite of many widespread disasters, however, the survivors appear to repopulate the stricken areas within a few seasons with their normal quota of bird life.

STORMS DESTROY MANY BIRDS

Unseasonably cold storms during migrations probably destroy more individuals than any other single cause. Opportunity is occasionally presented for observing their effects on bird life. Dr. T. S. Roberts made a careful survey following a spring snowstorm in Minnesota and North Dakota, and found that vast numbers of Lapland Longspurs had perished there on their northern migration. Severe blizzards in the middle East sometimes catch a host of Bluebirds and other small species on their way north.

Following such storms, holes in trees and nesting boxes are sometimes found

Photograph from U. S. Biological Survey

THE SNOWY OWL AT HOME

In grace and speed of flight this bird is more like a Hawk than an Owl. So swiftly does it navigate the air that it can capture a Duck on the wing or a hare afoot.

Photograph by Paul W. Hoffman

BLACK TERNS NEST IN THIS MID-WESTERN, FRESH-WATER MARSH

This is one of the comparatively few long-winged swimmers in the United States that commonly nest far away from the sea. It prefers the reedy fresh-water sloughs and marshes of the Middle Western States. Note the adult Tern perching on the operator's head. It did this repeatedly during one visit to this breeding place, apparently considering the operator a part of the scenery.

ESKIMOS DRIVING WILD GEESE TO A BANDING CORRAL

The white-cheeked Cackling Geese are the smallest of North American Geese. The individuals showing white heads are the little known Emperor Geese.

Photographs from U. S. Biological Survey

EIDER DUCKS SUPPLY WARM CLOTHING FOR THE ESKIMOS THAT LIVE HERE

The inhabitants of this semisubterranean village near Hooper Bay are among the most primitive of the native Alaskans. During spring and summer migratory wild fowl are one of their main sources of food supply, and the skins of Eider Ducks, furnish material for much of their clothing. A bird-banding expedition from the Biological Survey made its headquarters in this vicinity in 1924 (see text, page 240).

full of the dead bodies of the little victims that have tried to get shelter and have perished from the cold.

Telegraph and telephone wires and other obstacles kill great numbers of birds, which fly into them not only at night but often in broad daylight. Formerly, when lighthouses cast steady beams of dazzling light athwart the sky, migrating birds dashed against the glass of the lights and perished in large numbers. This source of mortality seems largely to have disappeared in recent years, since the continuous light has been replaced in many instances by a series of temporary flashes.

To these dangers may be added the recurring periods of scanty food supply and the never-ending depredations of their bird and mammal foes, including man in the case of game species. Pollution of waters by various means and other man-made death traps also take their toll. With the multiplication of swiftly moving automobiles, enormous numbers of small birds haunting the highways in some districts are stricken down and their pitiful bodies lie flattened in the dust.

CIVILIZATION AFFECTS THE BIRD POPULATION

It is comforting to know, however, that civilized man is appreciating bird life as never before and is throwing about the harmless or useful species the protection of the law. Furthermore, in the United States, Canada, and some other countries refuges, which already cover many millions of acres of forest and other lands, are being established in increasing numbers. In winter food and shelter are being provided, especially in times of stress, on a growing scale.

As a consequence of the changed conditions of the country through the clearing of primeval forests and the modern protection afforded birds in the United States, it is safe to say that there are now more small birds in North America than at any time in our history. On the other hand, our migratory wild fowl will never again equal the vast swarms that existed in the early days before enormous areas of water and marshlands were drained.

With so many opportunities to have little aluminum records carried by winged messengers to distant places, bird banding should invite the attention of all expeditions to the Far North and of research stations in regions where wild fowl, especially Ducks, Geese, and waders, breed in large numbers.

Capturing and banding of such of the breeding waterfowl and their young as winter in southern latitudes should also offer an interesting variation to the frequently monotonous everyday routine. Some of the banded birds would undoubtedly be taken later in lower latitudes, thus bringing word to the public of those in remote northern climes and adding valuable facts to our knowledge of the travels of feathered wanderers.

The Biological Survey will take pleasure in coöperating with sportsmen or future northern travelers who may be interested in this work. It will see that they are provided with necessary instructions, numbered aluminum bands, and other small equipment. If bird banding had been developed years ago, we might now have many precious records brought by birds from places in the Arctic regions visited by Greely, Peary, and other explorers.

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